

## **Economic Development and Sociopolitical Destabilization: A Re-Analysis**

Andrey Korotayev<sup>1,3</sup>, Ilya Vaskin<sup>1</sup>, Stanislav Bilyuga<sup>1</sup>, and Ilya Ilyin<sup>2</sup>

<sup>1</sup>*National Research University Higher School of Economics, Moscow, Russia*

<sup>2</sup>*Lomonosov Moscow State University*

<sup>3</sup>*Institute for African Studies, Russian Academy of Sciences*

### **Abstract**

Our empirical tests generally support the hypothesis that up to certain values of the average per capita income its growth tends to lead to increased risks of sociopolitical destabilization, and only in the upper range of this indicator its growth tends to be associated with the decrease of sociopolitical destabilization risks. However, our analysis has shown that for various indices of sociopolitical destabilization this curvilinear relationship can be quite different in some important details. On the other hand, we detect the presence of a very important exception. We show that the relationship between per capita GDP and the intensity of coups and coup attempts is not curvilinear; in this case we are rather dealing with a pronounced negative correlation; a particularly strong negative correlation is observed between this index and the logarithm of GDP per capita. We demonstrate that this fact makes the abovementioned bell-shaped relationship with respect to the integral index of sociopolitical destabilization considerably less distinct and makes a very significant contribution to the formation of its asymmetry (when the negative correlation between per capita GDP and sociopolitical destabilization among the richer countries looks much stronger than the positive correlation among poorer countries). However, our analysis shows that for all the other indices of sociopolitical destabilization we do witness the bell-shaped relationship. On the other hand, for example, in relation to such indices, as political strikes, riots and anti-government demonstrations we deal with such an asymmetry that is directly opposite to that mentioned above - with such an asymmetry, when a positive correlation between GDP and instability for poorer countries is much stronger than the negative correlation for richer countries.

*Corresponding author's e-mail:* akorotayev@gmail.com

*Citation:* Korotayev, Andrey, Ilya Vaskin, Stanislav Bilyuga, and Ilya Ilyin. 2018. Economic Development and Sociopolitical Destabilization: A Re-Analysis. *Clodynamics* 9: 59–118.

## Introduction

The impact of economic development (measured by GNI or GDP per capita) on sociopolitical destabilization has already been a subject of substantial research. Many respective studies are based on a seemingly plausible assumption that the higher a country's per capita income, the lower the probability of civil conflicts (e.g. Chapman and Reinhardt 2013; Collier and Hoeffler 2004; DiGiuseppe, Barry, and Frank 2012; Hegre and Sambanis 2006; Knutsen 2014; MacCulloch, 2004; MacCulloch and Pezzini 2010; Miguel, Satyanath, and Sergenti 2004; Miljkovic and Rimal 2008; Nafziger and Auvinen 2002; 2003: 30; Nefedov 2015; Parvin 1973; Weede 1981; see also Korotayev, Bilyuga, and Shishkina 2016, 2017a, 2017b, and 2018 for a detailed review of these works). On the other hand, Mancur Olson (1963) and Samuel Huntington (1968) suggest in their classical works that there is an inverted U-shaped<sup>1</sup> relationship, rather than a negative correlation, between per capita income levels and sociopolitical destabilization. According to them, the strongest destabilization risk is observed neither for high income countries nor for low income ones. Such a risk, according to them, is the most relevant for the middle income states.<sup>2</sup>

Olson (1963) suggests a rather comprehensive list of factors stipulating a positive correlation between average per capita income and sociopolitical destabilization level among modernizing polities, whereas Huntington (1968: 49–50) provides the following useful summary of Olson's suggestions:

Rapid economic growth:

- 1) disrupts traditional social groupings (family, class, caste), and thus increases 'the number of individuals who are déclassé... . . . and who are thus in circumstances conducive to revolutionary protests' (Olson, 1963: p. 532);
- 2) produces nouveaux riches who are imperfectly adjusted to and assimilated by the existing order and who want political power and social status commensurate with their new economic position;
- 3) increases geographical mobility which again undermines social ties, and, in particular, encourages rapid migration from rural areas to cities, which produces alienation and political extremism<sup>3</sup>;
- 4) increases the number of people whose standard of living is falling, and thus may widen the gap between rich and poor;

---

<sup>1</sup> Note that Huntington himself denotes it as a bell-shaped relationship (Huntington 1968: 43).

<sup>2</sup> See also Urnov 2008.

<sup>3</sup> Note that our own research on the topic confirms a very important role of fast urbanization in destabilization of modernizing societies (Grinin and Korotayev 2009). On the connection between growing complexity and destabilization see, e.g., Nijs 2015.

- 5) increases the incomes of some people absolutely but not relatively and hence increases their dissatisfaction with the existing order;
- 6) requires a general restriction of consumption in order to promote investment and thus produces popular discontent;
- 7) increases literacy, education, and exposure to mass media, which increase aspirations beyond levels where they can be satisfied<sup>4</sup>;
- 8) aggravates regional and ethnic conflicts over the distribution of investment and consumption;
- 9) increases capacities for group organization and consequently the strength of group demands on government, which the government is unable to satisfy.

We have found several further factors that stipulate a positive correlation between per capita income and sociopolitical destabilization in modernizing low- and middle-income economies. Some of these factors are characterized in our “trap at the escape from the Malthusian trap” model (Korotayev 2012 and 2014; Korotayev, Grinin, et al. 2010 and 2011; Korotayev, Khaltourina, et al. 2011; Korotayev, Malkov, and Grinin 2014; Korotayev, Malkov, et al. 2012; Korotayev and Malkov 2014; Korotayev and Zinkina 2010a, 2010b, 2011a, 2011b, 2011c, 2011d, and 2012a; Korotayev, Zinkina, et al. 2011; Grinin and Korotayev 2012; Grinin, Issaev, and Korotayev 2015) that could be described verbally as follows<sup>5</sup>:

- 1) A start of the escape from the Malthusian trap<sup>6</sup> tends to bring about a precipitous death rate decline and, consequently, an explosive acceleration of the population growth rates (which in itself can lead to a certain increase in sociopolitical tensions).
- 2) The start of the escape is accompanied by especially strong decreases in infant and under-five mortality, which raises the proportion of the youth in the overall population (and especially in the adult population)—the so-called ‘youth bulge’.

---

<sup>4</sup> Note that our own research on the topic confirms an important role of education growth in destabilization of modernizing societies (Grinin, Korotayev 2012; Korotayev et al. 2012; Korotayev, Bilyuga, and Shishkina 2017b, and 2018; Korotayev and Zinkina 2011a, 2011b, 2011c, and 2011d)

<sup>5</sup> See Figure 1 below for a cognitive scheme of the model.

<sup>6</sup> On the notion of ‘Malthusian trap’ see e.g. Artzrouni and Komlos 1985; Clark 2007; Grinin et al. 2009; Grinin, Korotayev, and Malkov 2008 and 2010; Kögel and Prskawetz, 2001; Komlos and Artzrouni 1990; Korotayev and Zinkina 2012a, 2013, 2014, and 2015; Steinmann, Prskawetz, and Feichtinger 1998. For the analysis of the sociodemographic dynamics in the Malthusian systems, see e.g. Komlos and Nefedov 2002; Nefedov 2004 and 2013; Turchin 2003 and 2009; Turchin and Korotayev 2006; Turchin and Nefedov 2009;.

3) This increases sharply the proportion of the population most inclined to radicalism.

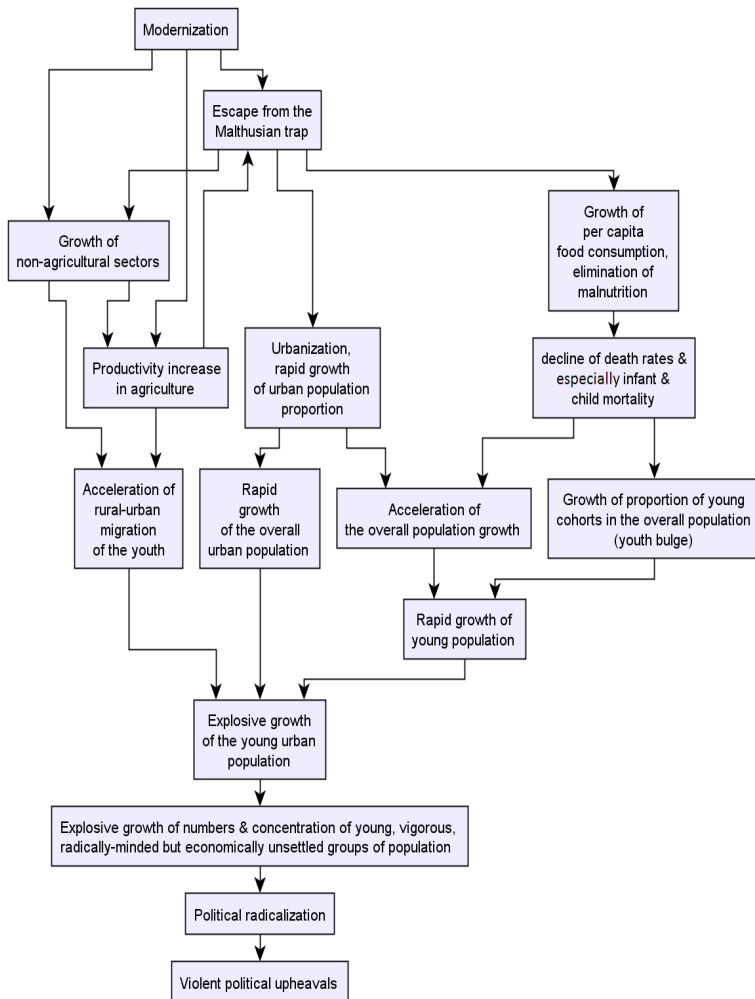
4) The explosive growth of the young population requires the creation of enormous numbers of new jobs, which is a serious economic problem, while the youth unemployment growth can have a particularly strong destabilizing effect, creating an 'army' of potential participants for various political upheavals, including civil wars, revolutions, and state breakdowns.

5) Escape from the Malthusian trap stimulates a vigorous growth of the urban population. Also, excessive population is forced out of the countryside by the growth of agricultural labor productivity. Massive rural-urban migration almost inevitably creates a significant number of those dissatisfied with their current position, as the rural-urban migrants are initially limited to unskilled low-paid jobs and low-quality accommodation.

6) Escape from the Malthusian trap is achieved through the development of new economic sectors and decline of the old ones. Such structural changes cannot proceed painlessly, as workers' qualification lose their value, lacking the necessary new skills, these workers are obliged to take up low-qualified jobs, making them socially discontent.

7) Young people make up the majority of rural-urban migrants, so the 'youth bulge' and intensive urbanization factors act together, producing a particularly strong destabilizing effect. Not only does the most radically inclined part of the population increase in numbers, but it also becomes concentrated in major cities / political centers.

8) This can result in serious political destabilization even against the background of a rather stable economic growth (see Figure 1). The probability of political destabilization naturally increases dramatically if an economic crisis occurs, or if the government loses its legitimacy due to any other causes (such as military defeats). However, the recent 'Arab Spring' events have demonstrated once again in a rather salient way that even this is not really necessary (see e.g. Korotayev and Zinkina 2011a; for the analysis of some other important demographic structural factors of sociopolitical destabilization see, e.g. Evans and Kelley 2017; Goldstone 1991, 2000, and 2002; Khlebnikov 2016; Turchin 2003, 2005, 2009, 2013, and 2016).



**Figure 1.** A cognitive model of the trap created by escaping from the Malthusian trap.

Some other factors that determine a positive correlation between average per capita incomes and sociopolitical destabilization levels in low and middle income economies can also be suggested.

1) Per capita income growth in authoritarian regimes tends to lead to an intensification of pro-democracy movements (Boix 2011; Brunk, Caldeira, and Lewis-Beck 1987; Burkhart and Lewis-Beck 1994; Cutright 1963; Dahl 1971;

Epstein et al. 2006; Lipset 1959; Londregan and Poole 1996; Moore 1966; Rueschemeyer, Stephens, and Stephens 1992) and, hence, to a certain destabilization of those regimes. And since in our database (as well as in reality) authoritarian states constitute a very high percentage of the number of states with the lowest values of per capita income, the effect of the growth of internal pressure on authoritarian regimes towards democracy with economic growth to some extent (but not completely) explains the positive correlation between average per capita income and the intensity of sociopolitical destabilization among low and middle income societies (Korotayev, Bilyuga, and Shishkina 2016, 2017a, and 2018).

2) Direct transitions from consistent autocracy to consolidated democracy are not common. As a rule, initial movement towards democracy (especially among low income economies) leads to the emergence of either a non-consistent autocracy or a partly democratic (i.e. intermediate) regime rather than a consolidated democracy. Consequently, for low income economies we find a reasonably strong positive correlation between GDP per capita and the prevalence of intermediate regimes. On the other hand, as has been shown time and again, these are the intermediate political regimes that are the most vulnerable to sociopolitical destabilization. Thus, Gurr (1974) maintains that semi-democracies are the type of regime most prone to destabilization. His observation was later examined statistically in a number of publications using cross-national data. This line of research resulted in the theory of an inverted U-shaped relationship between the regime type and the risks of sociopolitical destabilization. According to the theory, consistent democracies and autocracies are more stable regimes, whereas intermediate regimes (anocracies) display the lowest levels of political stability (Gates et al. 2000; Goldstone 2014; Goldstone et al. 2000, 2010; Mansfield and Snyder 1995; Marshall and Cole 2008; Nilsson and Silander 2016; Slinko et al. 2017; Ulfelder and Lustik 2007; Vreeland 2008).<sup>7</sup> Within middle and high intervals of per capita GDP one can observe a clear

---

<sup>7</sup> The presence of this regularity has been also supported by a number of studies undertaken by Russian researchers. Their research that has focused on the quantitative and qualitative analysis of the Arab Spring events has demonstrated in various ways (including the application of formal mathematical models) that inconsistently authoritarian regimes turned to be the most unstable; what is more in the multiple regression analyses performed by these authors the intermediate type of the political regime has consistently turned out to be one of the strongest destabilization predictors (Grinin and Korotayev 2012, 2013, and 2014; Grinin, Issaev, and Korotayev 2015; Korotayev et al. 2013, 2014, and 2016; Malkov et al. 2013; Grinin, Korotayev, 2012, 2014; Tsirel 2012a and 2012b). In addition, they have demonstrated that the intermediate type of political regime was a significant predictor of political destabilization during the revolutionary wave of 2013–2014 (Korotayev, Issaev, and Zinkina 2015; Korotayev, Issaev, and Vasiliev 2015).

tendency toward the replacement of intermediate regimes by democracies. Thus, an increased share of intermediate political regimes—the most unstable ones—is a characteristic of middle income countries. It is one more factor accounting for the inverted U-shaped relationship between per capita incomes and sociopolitical destabilization levels.

Thus, economic growth tends to increase the risks of sociopolitical destabilization up to a certain value of average per capita income. At high levels of economic development, a further increase in the value of this variable is accompanied by the decrease of destabilization risks. As a result, a negative correlation between per capita income and the risk of sociopolitical destabilization characterizes higher values of per capita income while a positive correlation is found for lower income values (Huntington 1968: 39–50; Olson 1963). Previous empirical tests with per capita GDP data have supported the presence of this inverted U-shaped relationship (Korotayev, Bilyuga, and Shishkina 2016, 2017a, 2017b, and 2018; Korotayev, Issaev, and Vasiliev 2015; Korotayev, Issaev, and Zinkina 2015).

However, as we demonstrated earlier (Korotayev, Bilyuga, and Shishkina 2017b, 2018), the general inverted U-shaped relationship between GDP per capita and the integral CNTS<sup>8</sup> indicator of sociopolitical destabilization<sup>9</sup> is not very impressive. Our straightforward test of this hypothesis generally supports the existence of a curvilinear inverted U-shaped relationship between per capita GDP and the integral CNTS indicator of sociopolitical destabilization. However, the correlation is statistically significant, but rather weak (see Figure 2).

In addition, this inverted U-shaped relationship is rather asymmetric: the negative correlation between GDP per capita and sociopolitical destabilization that is observed for the second and the third tertiles ( $t = 2.617$ ;  $p = 0.0045^{10}$ ) is considerably higher than the positive correlation for the first and the second tertiles ( $t = 1.775$ ;  $p = 0.038^{11}$ ). ANOVA-analysis provides similar results. In the whole, high income countries of the upper tertile are significantly less exposed to sociopolitical destabilization (by 34%) than the middle income economies of the intermediate tertile. However, average level of sociopolitical destabilization among middle income societies of the intermediate tertile is only moderately higher (by 18.5%) than among the low-income societies of the lower tertile; and the latter difference is only marginally significant.

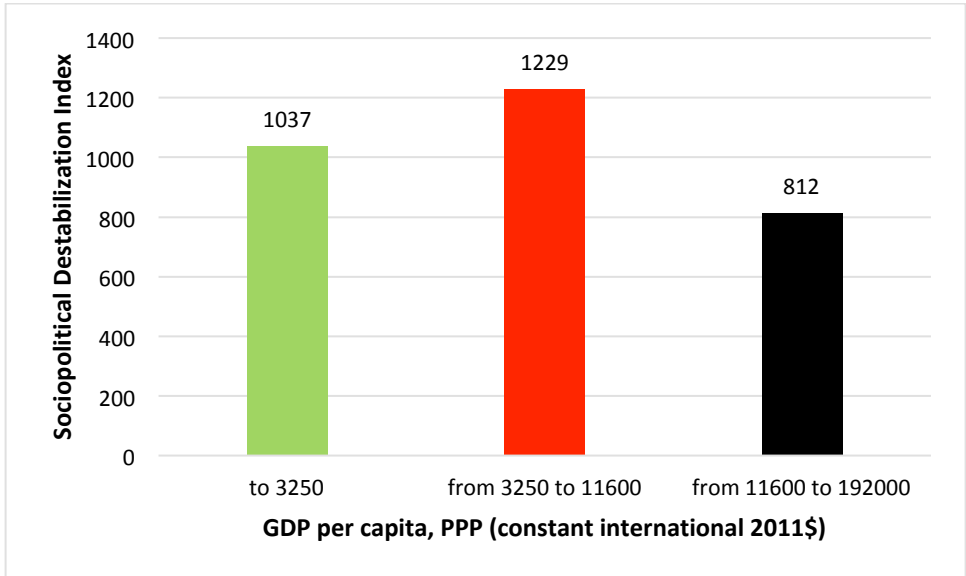
---

<sup>8</sup> CNTS = Cross-National Time Series Database (Banks, Wilson 2017).

<sup>9</sup> Description of materials and methodology for the computation index is provided in the Appendix.

<sup>10</sup> 1-tailed.

<sup>11</sup> 1-tailed.



**Figure 2.** Average value of sociopolitical destabilization index for GDP (PPP) per capita tertiles, 1960-2014<sup>12</sup>. Source: Korotayev, Bilyuga, and Shishkina 2017b, 2018.

So, are Olson and Huntington essentially wrong when they claim that the economic development is a powerful factor of destabilization in the modernizing social systems? Does not it turn out that substantially this is a rather weak factor only producing a marginally significant impact on the sociopolitical destabilization? Notwithstanding an apparent plausibility of such assumptions, as will be shown hereinafter, they should be regarded as premature and inaccurate.

## Tests

The point is that the integral CNTS index of socio-political destabilization which we used earlier in some respects may be viewed as a sort of “tyranny of averages”, as its various components often turn out to be directed oppositely and it is not infrequent when the very weak inverted U-shaped correlation between the integral CNTS index of sociopolitical destabilization and the GDP per capita can hide behind itself rather impressive correlations between per capita GDP and various components of the CNTS integral index.

Let us start from the point that only some components of the integral index have an inversed U-shaped relationship with GDP per capita, and those that

---

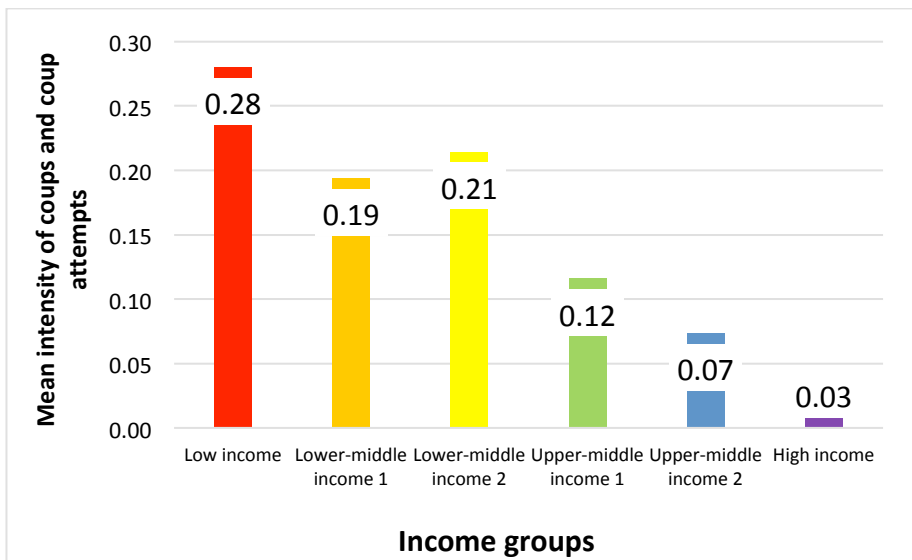
<sup>12</sup>Note:  $F = 5.109$ ,  $p = 0.006$ .

demonstrate this correlation have their inflection points located in different parts of the overall spectrum of per capita GDP.

The main exception is the CNTS variable 'domestic7' ("Coups and coup attempts"<sup>13</sup>), which will be examined below in more detail.

### Coups and Coup Attempts

This variable shows a clearly negative correlation with GDP per capita (Figure 3).



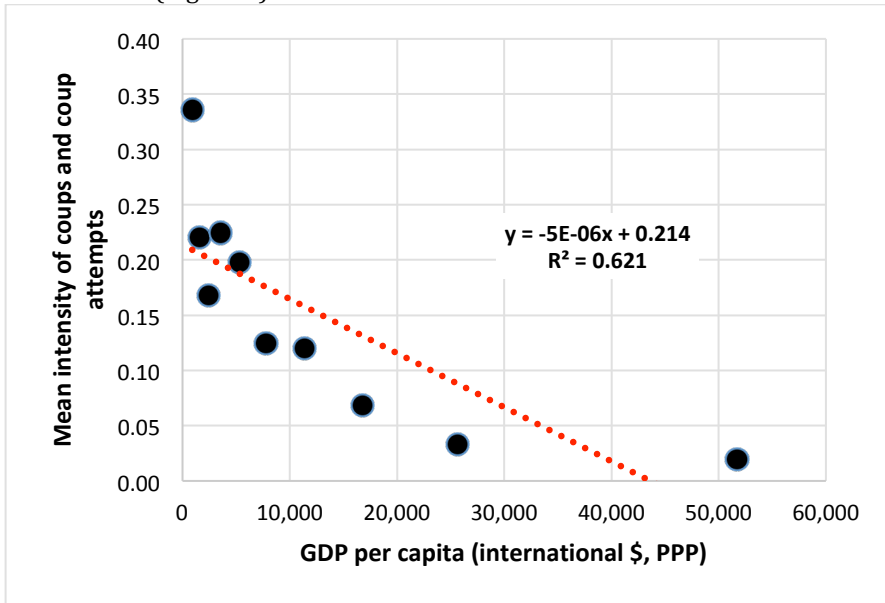
**Figure 3.** Mean intensity of coups and coup attempts by income groups, 1960-2015. Source: CNTS database (Banks, Wilson 2017); World Bank 2017.

As we see, one can notice a pronounced tendency toward the decline of intensity of coups and coup attempts with the growth of per capita GDP<sup>14</sup>. However, the

<sup>13</sup> Note that in CNTS itself this variable is denoted as Revolutions. However, this is defined as "any illegal or forced change in the top government elite, any attempt at such a change, or any successful or unsuccessful armed rebellion whose aim is independence from the central government" (Wilson 2017: 13). It is easy to notice that this definition covers not only and not so much revolutions as coups and coup attempts, and our analysis of specific events which CNTS includes under this label clearly indicates that the number of recorded coups and coup attempts surpasses manifold not only the number of revolutions per se but also the one of national liberation uprisings / secessionist rebellions. Thus, the dynamics of CNTS variable domestic7 primarily reflects the dynamics of coups and coup attempts.

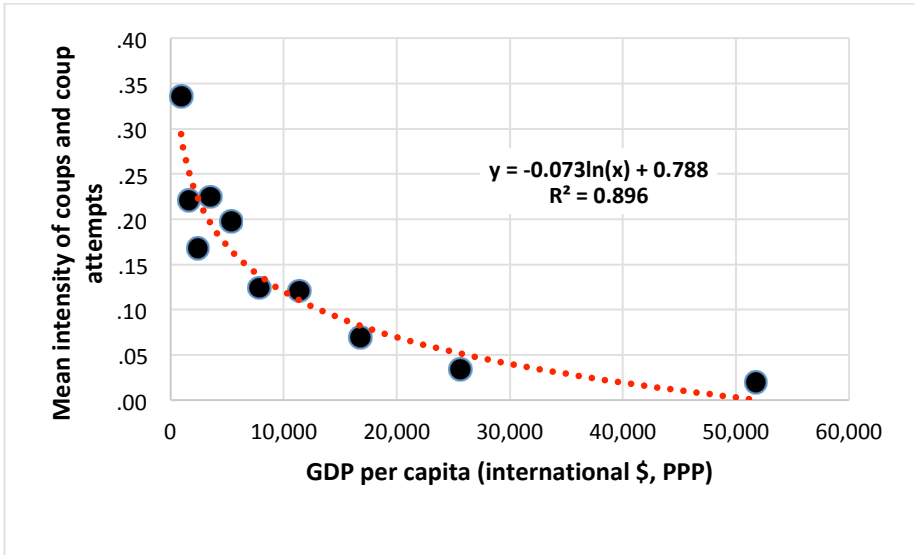
<sup>14</sup> Note, that the existence of this correlation has already been found in two earlier studies (Belkin and Schofer 2003; Bouzid 2011).

point that we are dealing here with a really strong negative correlation becomes especially obvious after the subdivision of the available dataset into deciles rather than sextiles (Figure 4).

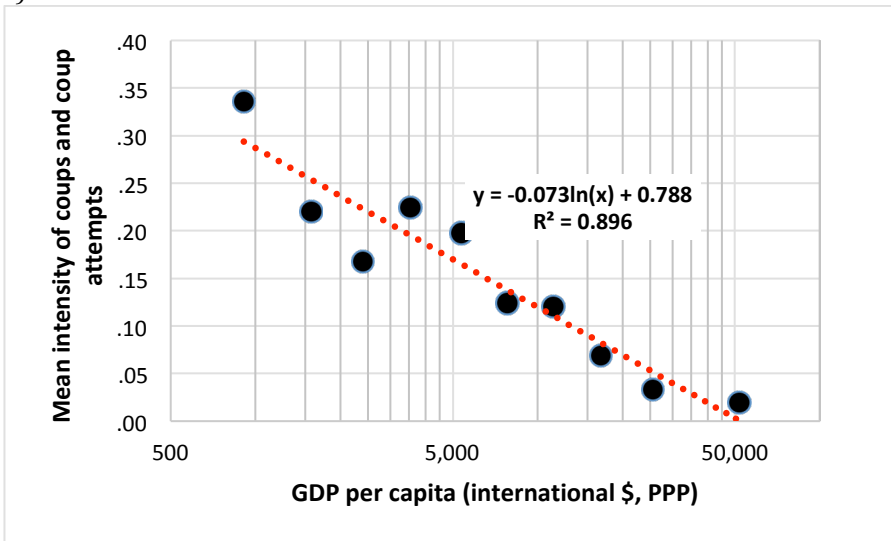


**Figure 4.** Correlation between GDP per capita (2011 international dollars at purchasing power parities [PPP]) and intensity of coups and coup attempts in respective years, 1960-2015.  $r = -0.768$ ;  $p = 0.007$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials)

As we can notice, there is a strong negative linear correlation between the level of GDP per capita and intensity of coups and coup attempts. However, it should be noted that in this case the linear regression significantly understates the real strength of the negative correlation, since a more detailed analysis indicates that the coup intensity actually correlates not with the natural value of GDP per capita but with its logarithm (see Figure 5a and b).



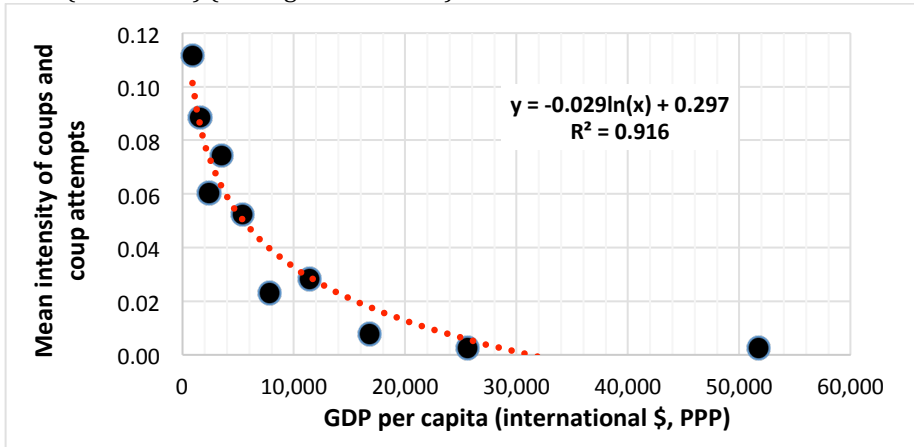
a) Natural X-axis scale.



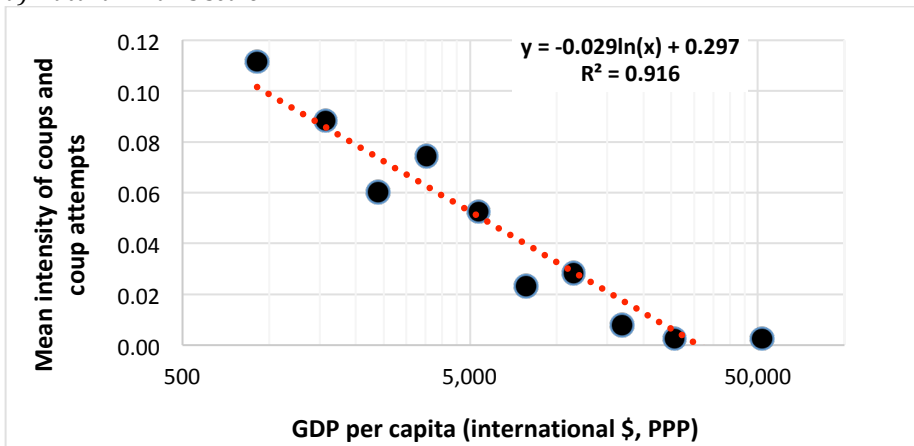
b) Logarithmic X-axis scale.

**Figure 5.** Correlation between GDP per capita (2011 international dollars, PPP) and intensity of coups and coup attempts in respective years, 1960-2015.  $r = -0.946$ ,  $p < 0.001$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017.

It is noteworthy that our attempt to verify the existence of this pattern using another database (Center for Systemic Peace 2017) yields a surprisingly similar correlation. With this dataset, intensity of coups and coup attempts also demonstrates a strong negative correlation with the log of GDP per capita; wherein the strength of correlation in the test performed with the second database (Center for Systemic Peace 2017) turns out to be even higher ( $R^2 = 0.916$ ) than in the previous test where CNTS database (Banks, Wilson 2017) is used ( $R^2 = 0.896$ ) (see Figure 6 a and b).



a) Natural X-axis scale



b) Logarithmic X-axis scale

**Figure 6.** Correlation between GDP per capita (2011 international dollars, PPP) and intensity of coups and coup attempts in respective years, 1960-2015. Source: Center for Systemic Peace 2017; World Bank 2017.

For sure, in this case we are dealing with a very interesting pattern. Indeed, it is hardly accidental that, unlike almost all the other forms of sociopolitical destabilization, intensity of governmental coups shows a very pronounced tendency towards decline against the background of modernization and economic growth. After all, coups are an extremely archaic form of sociopolitical destabilization which are widely attested even in pre-state societies (see, e.g., Earle 1997)—in contrast to such forms as, for example, general strikes and anti-government demonstrations that only emerge in the process of modernization. The negative correlation which we have identified certainly deserves special investigation, which, however, goes beyond the scope of this work. For us, what is essential here is the fact that this negative correlation makes a very significant contribution to the weakening of the inversed U-shaped relationship between GDP per capita and the integral CNTS index of sociopolitical destabilization. It is largely due to the fact that during the development of the scheme to calculate values of the integral CNTS sociopolitical destabilization index its authors assigned to coups and coup attempts the maximum weight (see Appendix). This weight is significantly bigger than the one assigned to any other destabilization component. As a result, there are grounds to maintain that the negative correlation which we have observed above significantly reduces the strength of the positive correlation between the per capita GDP and destabilization for lower income economies, and considerably increases the strength of the negative correlation for higher income societies. This creates an effect of a pronounced asymmetry of the inversed U-shaped relationship, when the positive correlation between GDP per capita and the CNTS integral sociopolitical destabilization index for lower income societies is much weaker in comparison with the negative correlation for higher income economies. At the same time, as we will see, for the mass sociopolitical destabilization of the central collapse type, the character of asymmetry turns out to be strictly opposite.

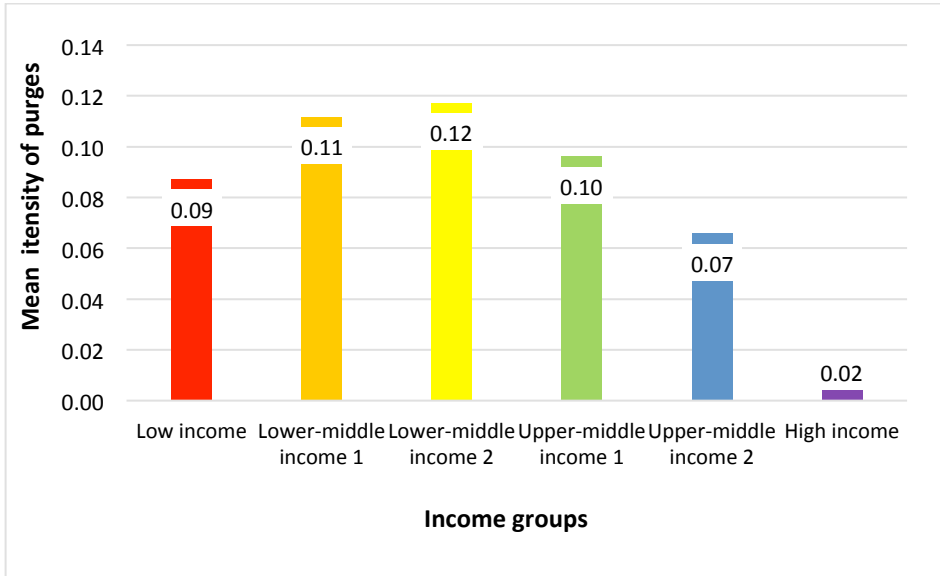
Still, there is another CNTS component of the integral index of sociopolitical destabilization which makes additional contribution to the above mentioned asymmetry: “purges” ('domestic5').<sup>15</sup>

### **Purges**

The distribution of mean intensity of “purges” among six income groups can be seen in Figure 7.

---

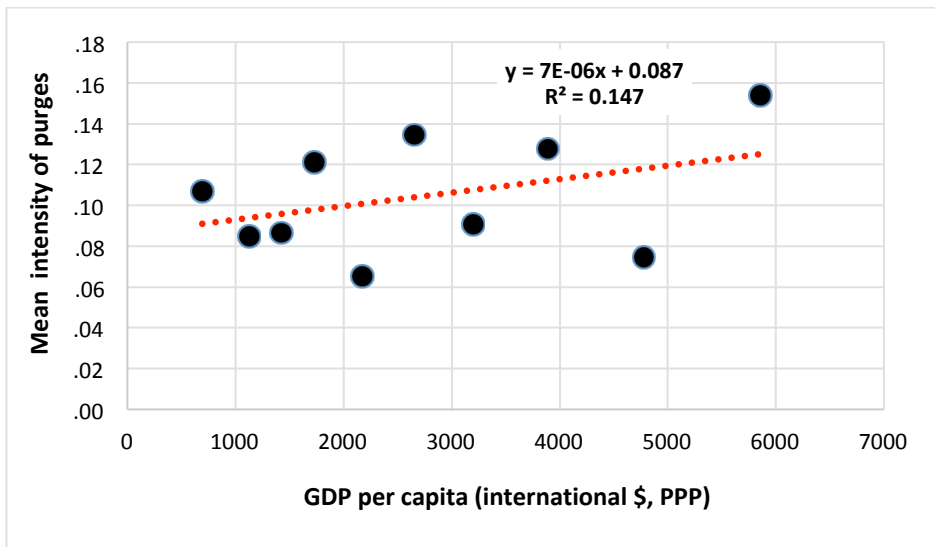
<sup>15</sup> CNTS domestic 5 = “Purges”. The CNTS provides the following definition for purges (domestic5): “any systematic elimination by jailing or execution of political opposition within the ranks of the regime or the opposition” (Wilson 2017: 13).



**Figure 7.** Mean intensity of purges by income groups, 1960–2015. Source: CNTS database (Banks, Wilson 2017); World Bank 2017.

As we see, a very weak positive correlation is typical for this rather special indicator of sociopolitical destabilization in the range of low values of GDP per capita (from the minimum up to \$6,400 - \$6,500, which roughly corresponds to a boundary between lower middle and upper middle income countries); on the other hand, we find a strong negative correlation for higher values, which, of course, further reduces the overall inverted U-shaped relationship, as it significantly increases its asymmetry and at the same time moves it in the direction of the general negative correlation.

All in all, per decile analysis of the interval from the minimum to \$6,425 yields the following results (see Figure 8):

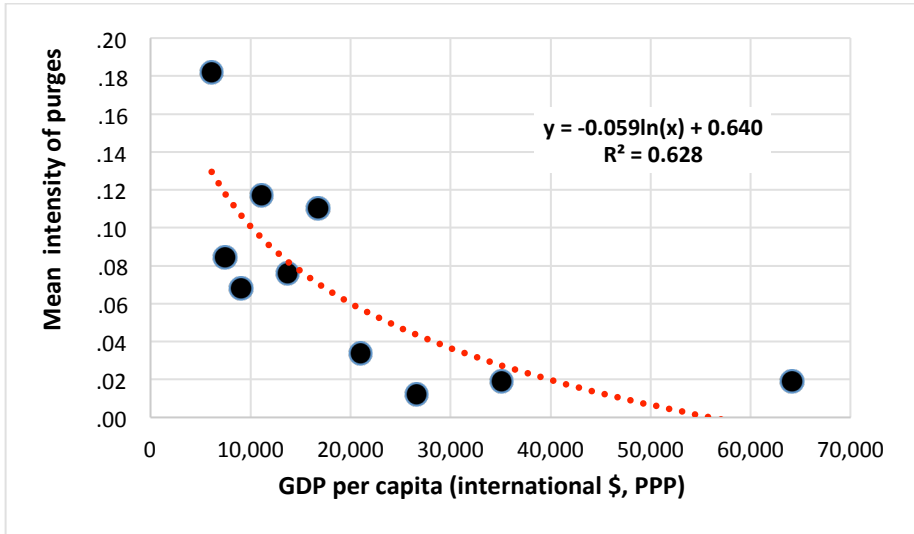


**Figure 8.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of purges in respective years in the interval from the minimum to \$6,425<sup>16</sup>, 1960-2015.  $r = 0.34$ ,  $p = 0.337$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017. Notes. Mean values of intensity of purges per decile in the interval from the minimum to \$6,425. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

As we can see, for low and middle income countries where GDP per capita is less than \$6,425 we find a very weak insignificant positive correlation between per capita GDP and intensity of purges. Although this correlation is statistically insignificant, it still has its logic, because, as we shall see, within this interval, one can notice a growth of almost all the indicators of sociopolitical destabilization, which quite logically leads to intensification of repressive actions by authorities.

For higher GDP per capita values (within the interval of about \$5,500—\$6,500) we observe a totally different correlation (Figure 9):

<sup>16</sup> Which corresponds to deciles from 1 to 5 of the general population of the database cases.



**Figure 9.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of purges in respective years in the interval from \$4,324 to the maximum<sup>17</sup>, 1960-2015.  $r = -0.793$ ,  $p = 0.006$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

The point is that for middle and high income countries (starting from the interval of \$5,500 - \$6,500), we observe a strong statistically significant negative correlation between GDP per capita (2011 international dollars, PPP) and intensity of purges. Thus, starting from this level, further growth of per capita GDP is accompanied with a fairly steady tendency toward a decline in intensity of purges.

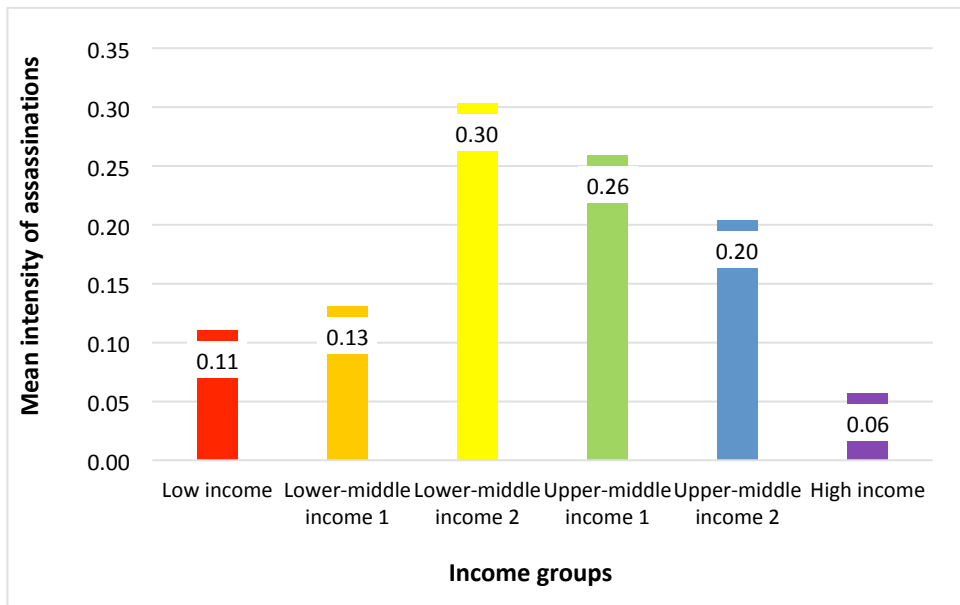
A positive correlation in the left part of the spectrum is considerably stronger for the other indicators of sociopolitical destabilization.

---

<sup>17</sup> Which corresponds to deciles from 6 to 10 of the general population of the database cases.

### Assassinations

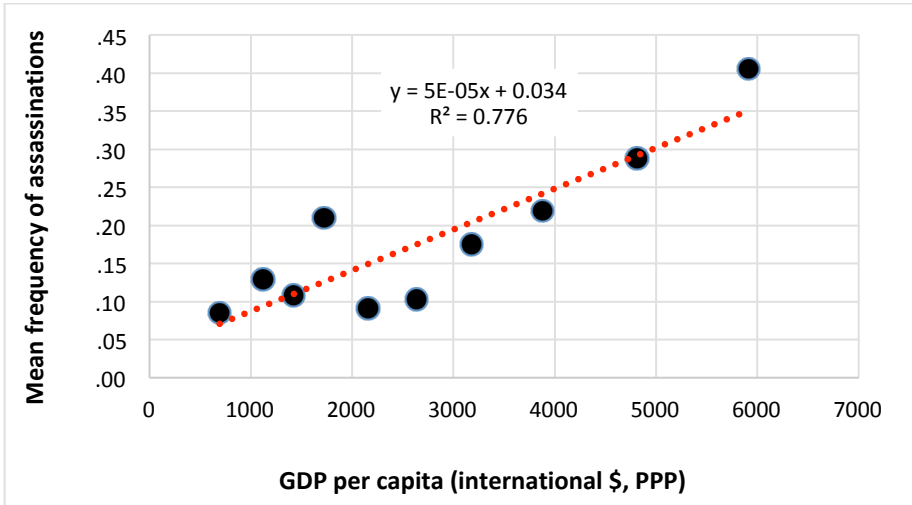
For assassinations<sup>18</sup> a strong positive correlation is observed for the interval up to the border between lower middle and upper middle income (about \$6,500; see Figure 10).



**Figure 10.** Mean intensity of assassinations by income groups, 1960–2015. Source: CNTS database (Banks, Wilson 2017); World Bank 2017.

Per decile analysis of correlation between per capita GDP and frequency of assassinations for the interval of GDP per capita values from the minimum to about \$6,500 yields the following results (Figure 11):

<sup>18</sup> CNTS domestic 1 = Assassinations. The CNTS provides the following definition for “Assassinations” (domestic1): “any politically motivated murder or attempted murder of a high government official or politician” (Wilson 2017: 12).

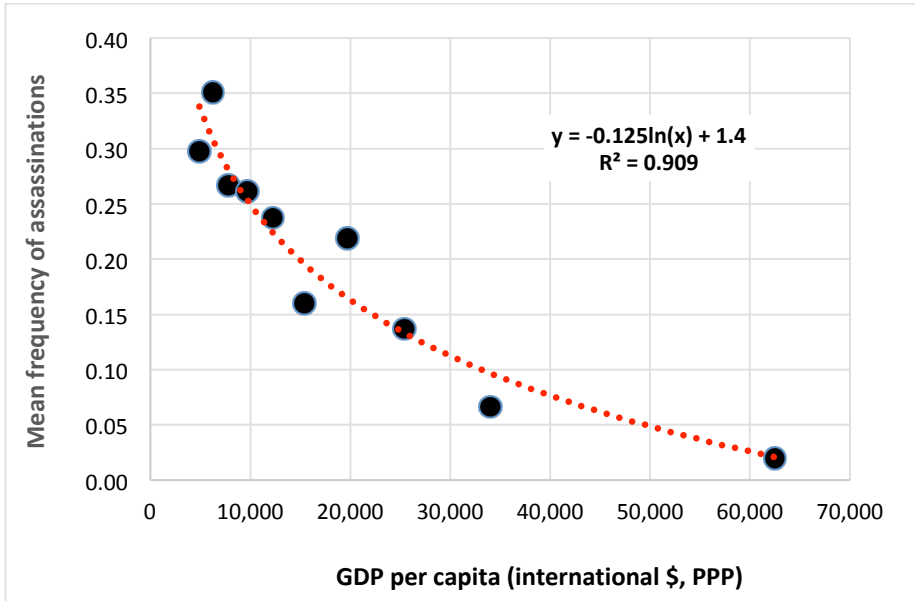


**Figure 11.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of assassinations in respective years in the interval from the minimum up to \$6,471,19 1960-2015<sup>20</sup>.  $r = 0.881$ ,  $p = 0.001$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

As we can see, from the minimum up to the interval of \$5,500 - \$6,500 the growth of GDP per capita is accompanied by a quite pronounced tendency towards the increase in assassinations frequency. Within this interval (corresponding to low and lower middle income economies), we find a strong ( $r = 0.881$ ) and statistically significant ( $p = 0.001$ ) positive correlation between per capita GDP and frequency of assassinations. However, a directly opposite correlation can be traced starting from the level of about \$6,500 (which just corresponds to the boundary which separates lower middle income economies from the upper middle income ones; see Figure 12).

<sup>19</sup> Which corresponds to deciles from 1 to 5 of the general population of the database cases.

<sup>20</sup> Mean values of intensity of assassinations per decile in the interval from the minimum to \$6,471.



**Figure 12.** Correlation between GDP per capita (2011 international dollars, PPP) and intensity of assassinations in respective years in the interval from \$4,324 to the maximum<sup>21</sup>, 1960–2015<sup>22</sup>.  $r = -0.953$ ,  $p < 0.001$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

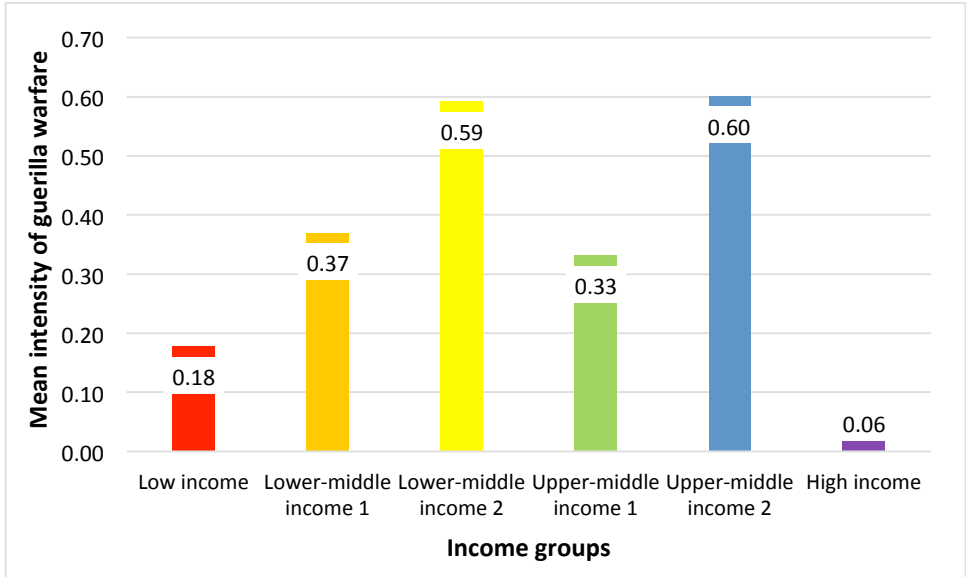
Thus, for the countries with upper middle and high income we observe an even more pronounced trend of decline of assassinations frequency with the growth of GDP per capita. As we can see, on the right side of the spectrum there is an even stronger ( $r = -0.953$ ) statistically significant ( $p < 0.001$ ) negative correlation between per capita GDP and frequency of assassinations.

<sup>21</sup> Which corresponds to deciles from 6 to 10 of the general population of the database cases.

<sup>22</sup> Mean values of frequency of assassinations per decile in the interval from \$4,325 to the maximum.

## Guerrilla Warfare

A statistically significant positive correlation in the interval up to the boundary between lower middle and upper middle income (about \$6,500) can be traced for the “guerrilla warfare”<sup>23</sup> index (see Figure 13).

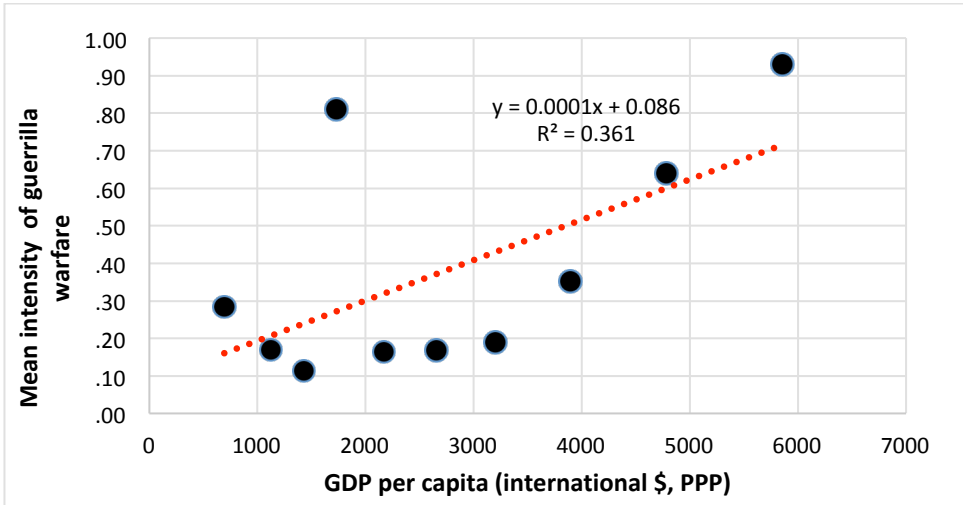


**Figure 13.** Mean intensity of guerrilla warfare by income groups, 1960—2015. Source: CNTS database (Banks, Wilson 2017); World Bank 2017.

At the same time, as we can see, the second (and even slightly higher) peak of guerrilla warfare intensity is observed for the upper echelon of upper middle income countries (\$12,000 - \$23,000).

We analyze now the correlation between GDP/capita and guerrilla warfare intensity for the left and right parts of the spectrum of GDP per capita in more detail. Starting with the left part of the spectrum of GDP per capita values, the respective correlation can be seen in Figure 14:

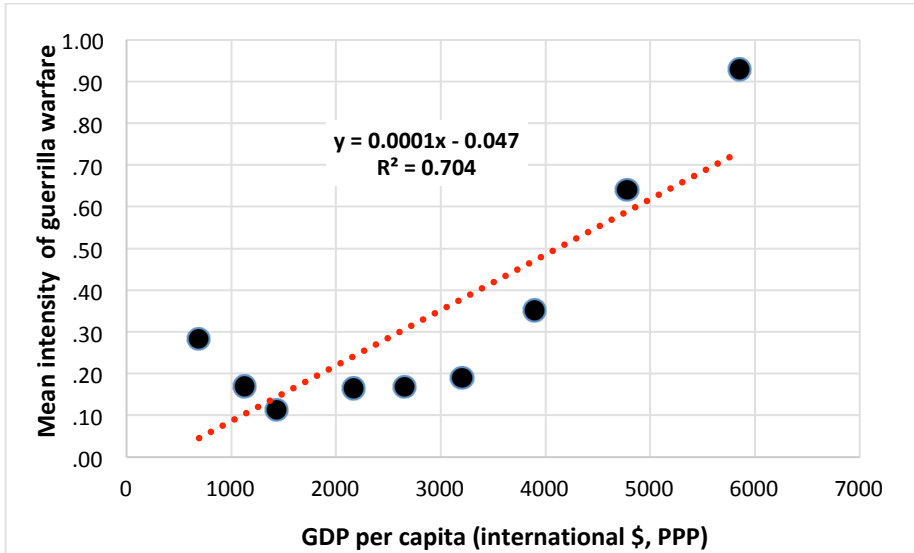
<sup>23</sup> CNTS domestic 3 = Guerrilla Warfare. The CNTS provides the following definition for “Guerrilla Warfare” (domestic3): “Any armed activity, sabotage, or bombings carried on by independent bands of citizens or irregular forces and aimed at the overthrow of the present regime” (Wilson 2017: 13).



**Figure 14.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of guerrilla warfare for respective years in the interval from the minimum to \$6,425, 1960-2015<sup>24</sup>.  $r = 0.603$ ,  $p = 0.033$  (one-tailed significance test). Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

As we can see, in relation to guerrilla warfare intensity, one can notice quite a pronounced tendency toward the increase with GDP per capita growth within the interval that is almost identical with the one for which we find a stable positive correlation between per capita GDP and intensity of assassinations. We mean the lower (left) part of the GDP/capita spectrum (which corresponds to low and lower middle income economies) with values of GDP per capita up to the range of \$5,500 - \$6,500. However, with respect to the intensity of guerrilla warfare we only observe a statistically marginal positive correlation. On the other hand, it should be noted that a relatively weak strength of the correlation ( $r = 0.603$ ) is explained to a very large extent by the presence of an outlier which can be noticed in the range of about \$1,500 - \$2,000 (we will have to determine the nature of such an outlier in future). Omitting the outlier, we deal with an unambiguously strong statistically significant correlation (see Figure 15).

<sup>24</sup> Mean values of intensity of guerilla warfare per decile for the interval from the minimum to \$6,425.

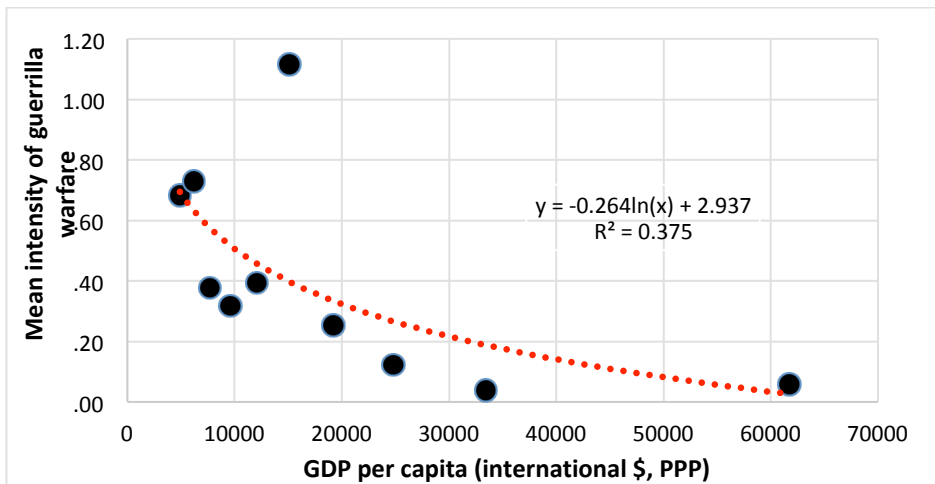


**Figure 15.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of guerrilla warfare for respective years in the interval from the minimum to \$6,424,25 1960-2015<sup>26</sup>, excluding outlier.  $r = 0.841$ ,  $p = 0.005$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017.

On the other hand, for middle and high income countries one can observe quite a pronounced statistically significant trend of decline of guerrilla warfare with the GDP per capita growth. This trend can be traced starting from the range of around \$5,500 - \$7,000 which can be seen in Figure 16.

<sup>25</sup> Which corresponds to deciles from 1 to 5 of the general population of the database cases.

<sup>26</sup> Mean values of intensity of guerilla warfare per decile for the interval from the minimum to \$6,425.



**Figure 16.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of guerrilla warfare for respective years for the interval from \$4,325 to the maximum,<sup>27</sup> 1960-2015<sup>28</sup>.  $r = -0,616$ ,  $p = 0,029$  (one-tailed significance test). Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

However, it should be noted that the maximum value of guerrilla warfare intensity is still found for the range of GDP/capita values around \$13,500 - \$17,000. As a result, it can be stressed that we are dealing with a kind of a bimodal distribution where the maximum mean intensity of guerrilla warfare can be observed, on the one hand, for the upper echelon of lower middle income countries and, on the other, for the upper echelon of upper middle income economies (note that this mean intensity for the second income group is even slightly higher than for the first<sup>29</sup>). Of course, it is difficult not to consider this point as one of the factors contributing to the formation of the so called "middle income trap"<sup>30</sup>.

<sup>27</sup> Which corresponds to deciles from 6 to 10 of the general population of the database cases.

<sup>28</sup> Mean values of intensity of guerilla warfare per decile in the interval from \$4,325 to the maximum.

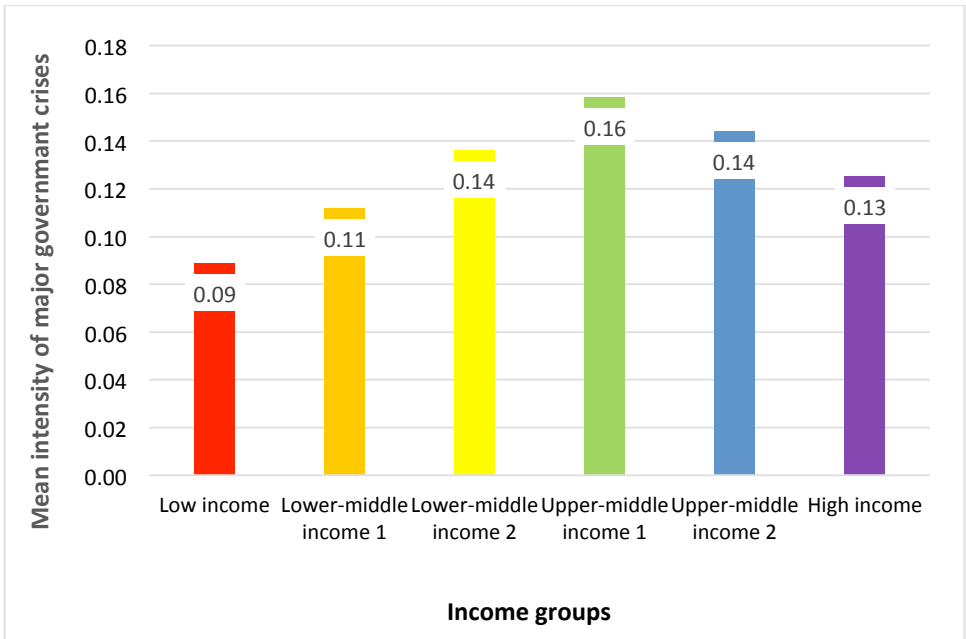
<sup>29</sup> However, this difference cannot be characterized as statistically significant.

<sup>30</sup> The middle-income trap is usually defined as "the phenomenon of hitherto rapidly growing economies stagnating at middle-income levels and failing to graduate into the ranks of high-income" (Aiyar et al. 2013: 3; see also Cai 2012; Grinin, Tsirel, and Korotayev 2015; Kharas and Kohli 2011; Kohli and Mukherjee 2011; The World Bank 2012: 12).

A significantly stronger correlation in the left part of the spectrum of GDP per capita values can be observed with respect to major government crises<sup>31</sup>.

### Major Government Crises

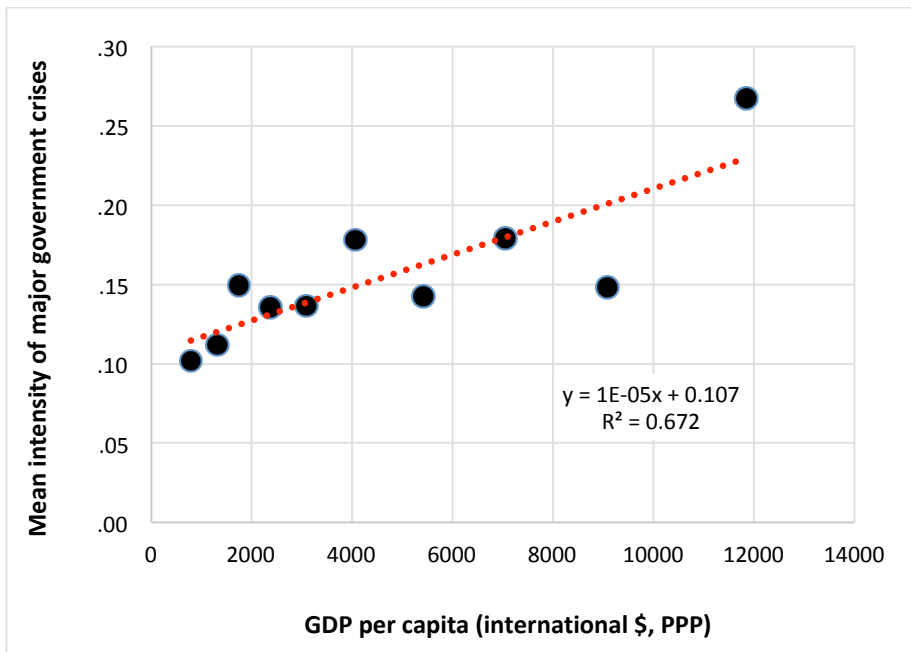
The distribution of intensity of “major government crises” among the six income groups can be seen in Figure 17.



**Figure 17.** Mean intensity of major government crises by income groups, 1960-2015. Source: CNTS database (Banks, Wilson 2017); World Bank 2017.

Per decile analysis of the left part of the spectrum of GDP per capita values yields the following results, which can be seen in Figure 18.

<sup>31</sup> CNTS domestic 4 = “Major Government Crises”. The CNTS provides the following definition for Major Government Crises (domestic4): “any rapidly developing situation that threatens to bring the downfall of the present regime—excluding situations of revolt aimed at such overthrow” (Wilson 2017: 12).

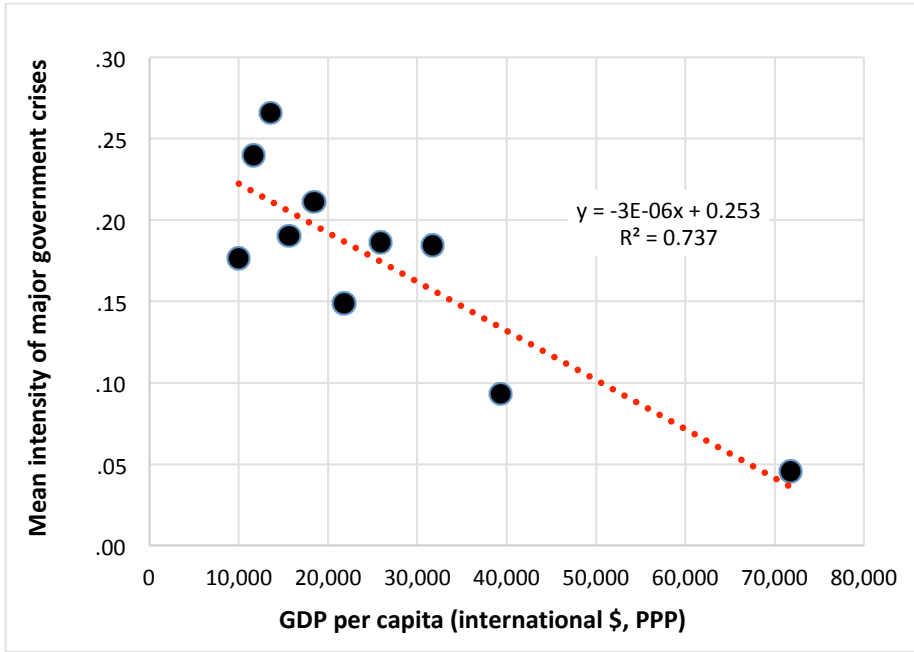


**Figure 18.** Per decile correlation between GDP per capita, PPP (international \$, 2011), and intensity of major government crises in respective years in the interval from the minimum to \$13,482<sup>32</sup> 1960-2015<sup>33</sup>.  $r = 0.82$ ,  $p = 0.004$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

As can be seen in Figure 18 above, in the left part of the spectrum of GDP per capita values up to the interval of about \$10,500 - \$13,500 one finds a strong ( $r = 0.82$ ) and statistically significant ( $p = 0.004$ ) positive correlation between GDP per capita and intensity of major government crises. Starting from the range of \$12,500 - \$14,500 we see a pronounced correlation in the opposite direction (Figure 19).

<sup>32</sup> Which corresponds to deciles from 1 to 7 of the general population of the database cases.

<sup>33</sup> Mean values of intensity of major governmental crises per decile for the interval from the minimum to \$13,482.



**Figure 19.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of major government crises in respective years for the interval from \$9,228 to the maximum,<sup>34</sup> 1960-2015<sup>35</sup>.  $r = -0.855$ ,  $p = 0.002$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

For an even more extended interval of the spectrum of GDP per capita values we observe a statistically significant positive correlation between per capita GDP and intensity of riots<sup>36</sup>—another important index of sociopolitical destabilization.

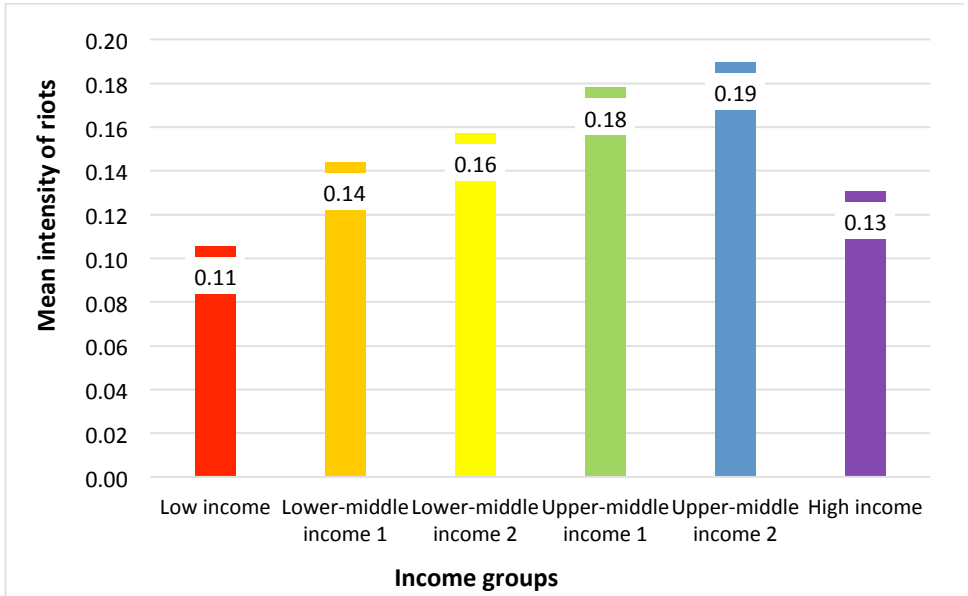
<sup>34</sup> Which corresponds to deciles from 8–10 of the general population of the database cases.

<sup>35</sup> Mean values of intensity of major governmental crises per decile for the interval from \$9,228 to the maximum.

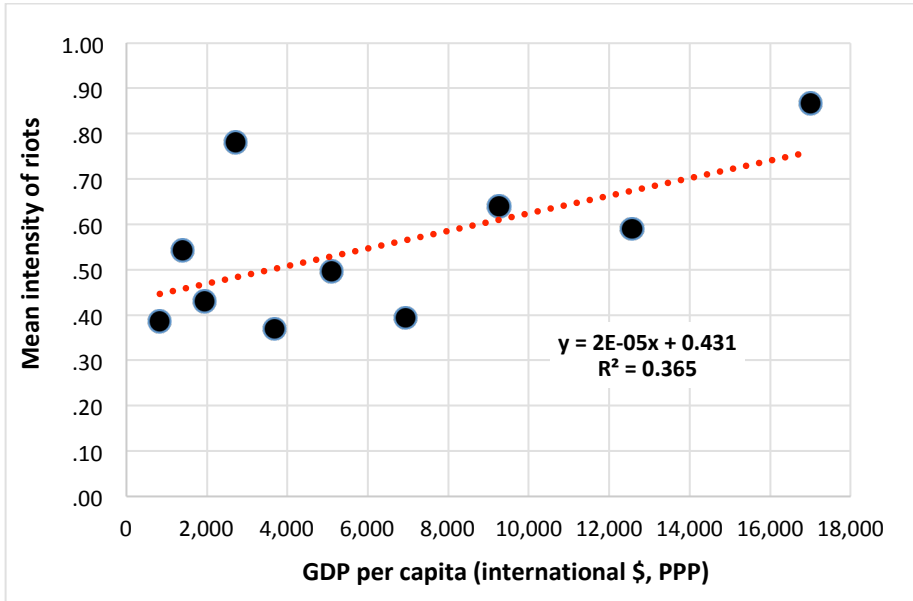
<sup>36</sup> CNTS domestic 6 = “Riots”. The CNTS provides the following definition for Riots (domestic6): “any violent demonstration or clash of more than 100 citizens involving the use of physical force” (Wilson 2017: 13).

## Riots

The distribution of intensity of “riots” among the six income groups can be seen in Figure 20.



**Figure 20.** Mean intensity of riots by income groups, 1960-2015. Source: CNTS database (Banks, Wilson 2017); World Bank 2017.



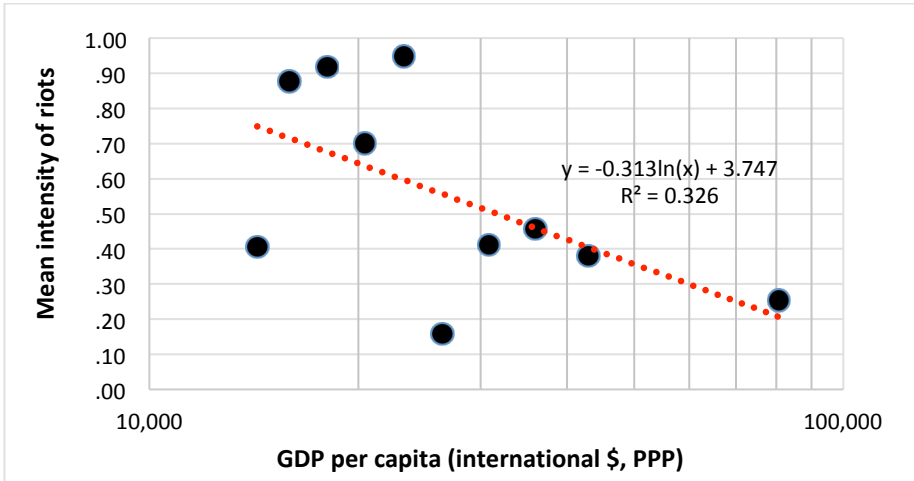
**Figure 21.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of riots for respective years for the interval from the minimum to \$19,960<sup>37</sup> 1960–2015<sup>38</sup>.  $r = 0.607$ ,  $p = 0.032$  (one-tailed significance test). Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

The per decile analysis of the positive correlation in the left part of the spectrum of GDP per capita values yields the following results (Figure 21, above).

As we can see, this positive correlation is not particularly strong, but it is statistically significant and can be traced from the minimum to the level of around \$20,000. It must be stressed that the negative correlation in the right part of the spectrum of GDP per capita values can also hardly be regarded as really strong; moreover, it can only be described as marginally significant (Figure 22).

<sup>37</sup> Which corresponds to deciles from 1 to 7 of the general population of the database cases.

<sup>38</sup> Mean values of intensity of riots per deciles for the interval from the minimum to \$19,960.



**Figure 22.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of riots for respective years for the interval from \$13,485 to the maximum,<sup>39</sup> 1960–2015, logarithmic scale<sup>40</sup>.  $r = 0.575$ ,  $p = 0.082$  (one-tailed significance test). Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

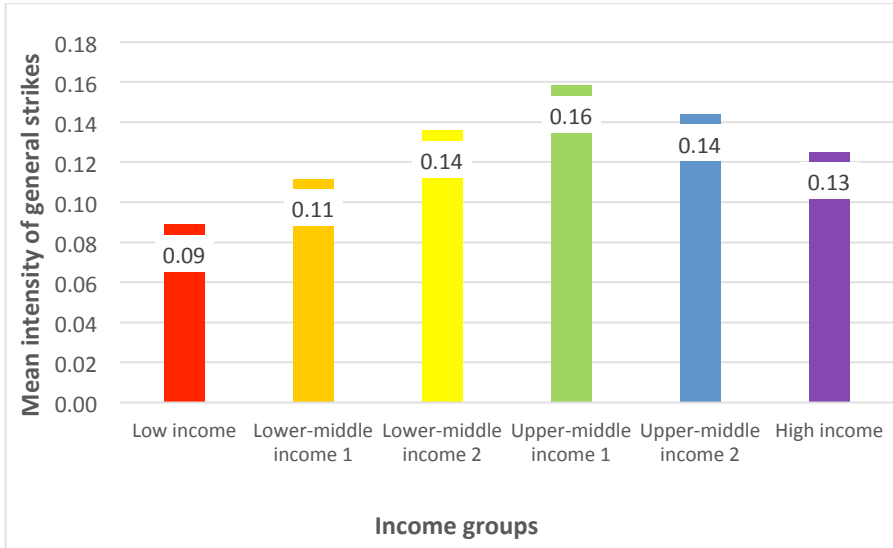
A much stronger positive correlation in the left part of the spectrum of GDP per capita values is observed for such a significant type of socio-political destabilization as general strikes.

<sup>39</sup> Which corresponds to deciles from 8 to 10 of the general population of the database cases.

<sup>40</sup> Mean values of intensity of mass riots per decile for the interval from \$13,485 to the maximum.

## General Strikes

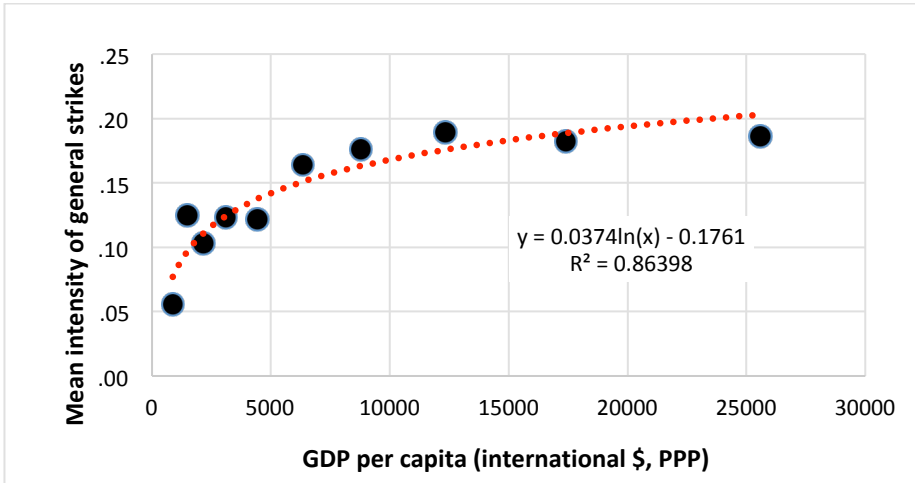
The positive correlation between GDP per capita and intensity of general strikes<sup>41</sup> is rather clear and it is attested in a rather wide interval (meanwhile, the positive correlation in the left part of the spectrum is much more pronounced than the negative one in the right; see Figure 23).



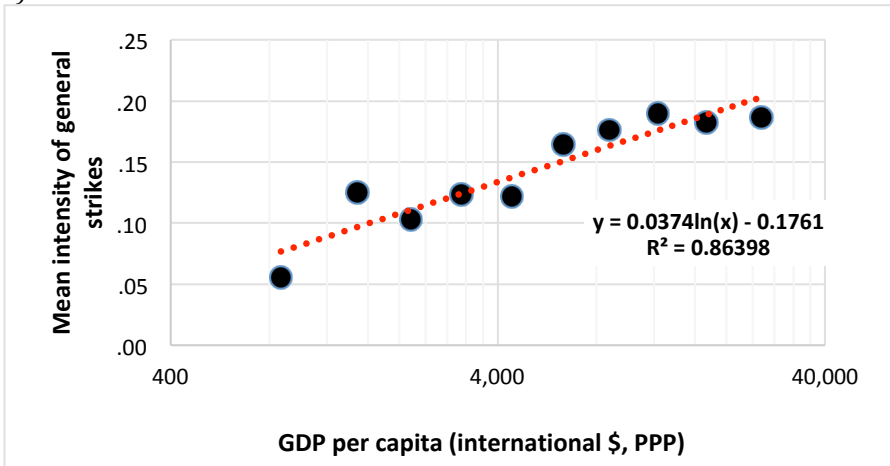
**Figure 23.** Mean intensity of general strikes by income groups, 1960-2015. Source: CNTS database (Banks, Wilson 2017); World Bank 2017.

Per decile analysis of the left part of the spectrum of GDP per capita values yields the following results (Figure 24a and b).

<sup>41</sup> CNTS domestic 2 = General Strikes. The CNTS provides the following definition for general strikes (domestic2): “any strike of 1,000 or more industrial or service workers that involves more than one employer and that is aimed at national government policies or authority” (Wilson 2017: 12).



a) Natural X-axis scale



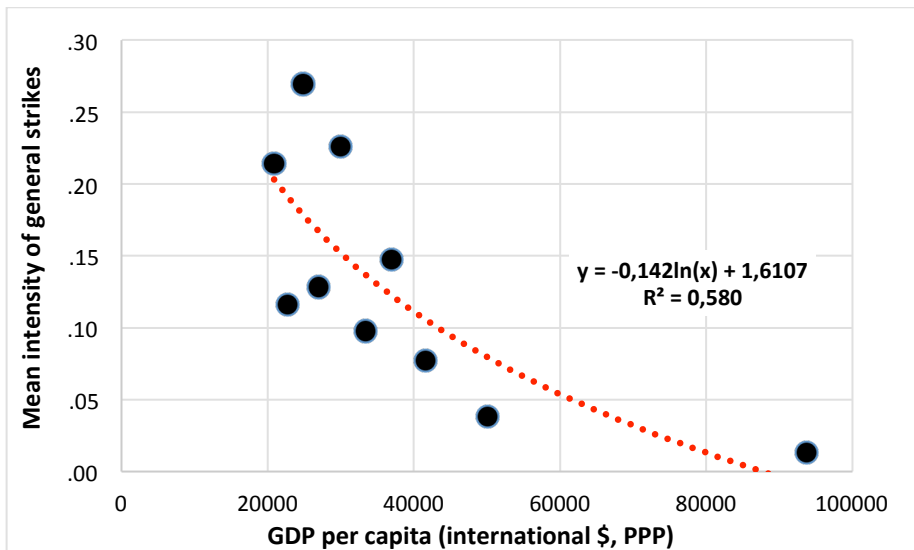
b) Logarithmic X-axis scale

**Figure 24.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of general strikes in respective years in the interval from the minimum to \$31,671,<sup>42</sup> 1960–2015<sup>43</sup>.  $r = 0.93$ ,  $p < 0.001$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

<sup>42</sup> Which corresponds to deciles from 1 to 9 of the general population of the database cases.

<sup>43</sup> Mean values of intensity of general strikes per decile in the interval from the minimum to \$ 31,671.

As may be seen above at Figure 24, in the left part we find a very strong ( $r = 0.93$ ) and statistically significant ( $p < 0.001$ ) positive correlation between the logarithm of GDP per capita and intensity of general strikes. That is to say that in this interval (which includes the majority of human societies) the higher the mean level of economic prosperity, the higher the intensity of general strikes. Moreover, the analysis of Figure 24 indicates that in fact the growth of GDP per capita is accompanied by the growth of strike intensity right up to the interval of \$10,500 - \$14,500; after it, as we will explore below, within the interval of \$10,500 - \$26,000 the mean level of strike intensity remains very high but within this range the growth of GDP per capita is not accompanied by any further growth of strike intensity. Starting from the interval \$24,000 - \$26,000, the further growth of GDP per capita is accompanied by a definite tendency towards a decline in strike intensity (Figure 25).



**Figure 25.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of general strikes in respective years in the interval from \$19,969 to the maximum<sup>44</sup>, 1960–2015<sup>45</sup>.  $r = -0.77$ ,  $p = 0.01$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

<sup>44</sup> Which corresponds to deciles from 9 to 10 of the general population of the database cases.

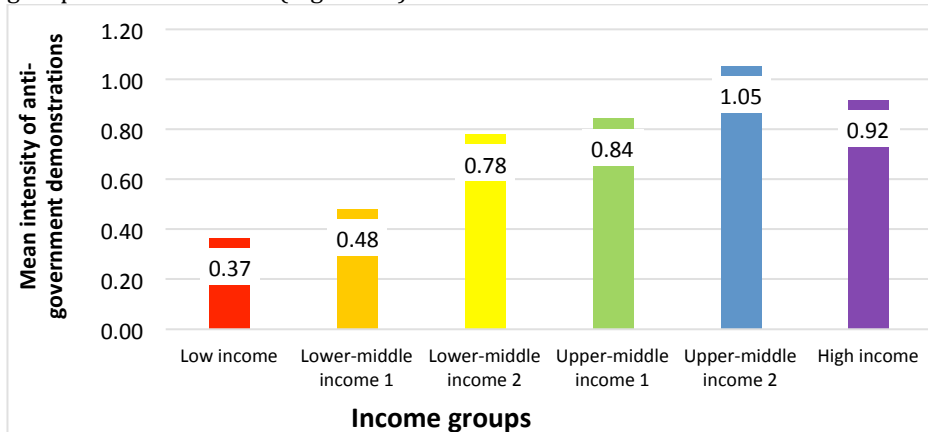
<sup>45</sup> Mean values of intensity of general strikes per decile in the interval from \$19,969 to the maximum.

One may note that in the right part of the spectrum of GDP per capita values (corresponding mainly to high income countries) there is a rather strong ( $r = -0.77$ ) statistically significant ( $p = 0.01$ ) negative correlation between the logarithm of GDP per capita and intensity of general strikes. Thus, unlike low and lower-middle income countries where the growth of GDP per capita tends to be accompanied by the growth of intensity of general strikes, in high income countries the tendency is that the further growth of GDP/capita is accompanied not by the growth, but by the decline in strike intensity. However, the positive correlation in the left part of the spectrum of GDP per capita values is much stronger than the negative correlation which is observed in the right part.

In general, the positive correlation between GDP per capita and intensity of general strikes with respect to low and middle income countries is extremely strong ( $r = 0.93^{46}$ ). However, there is another type of socio-political destabilization for which the positive correlation with GDP per capita in the left part is still much stronger. These are anti-government demonstrations.

### Anti-government demonstrations

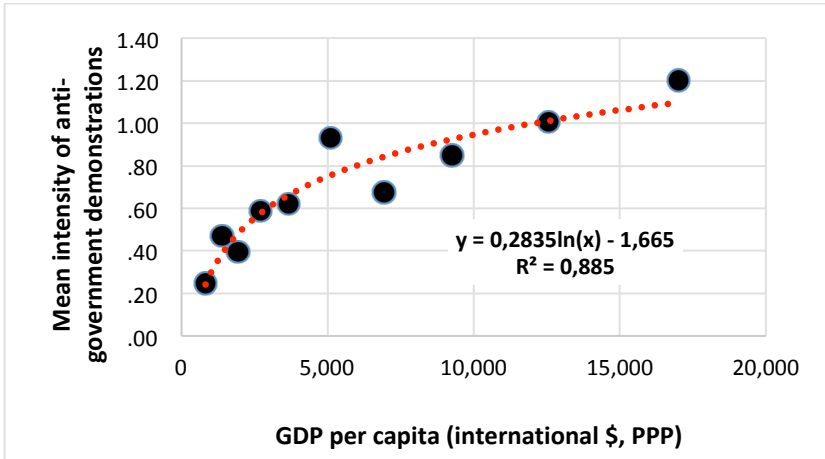
Distribution of intensity of anti-government demonstrations<sup>47</sup> by six income groups looks as follows (Figure 26):



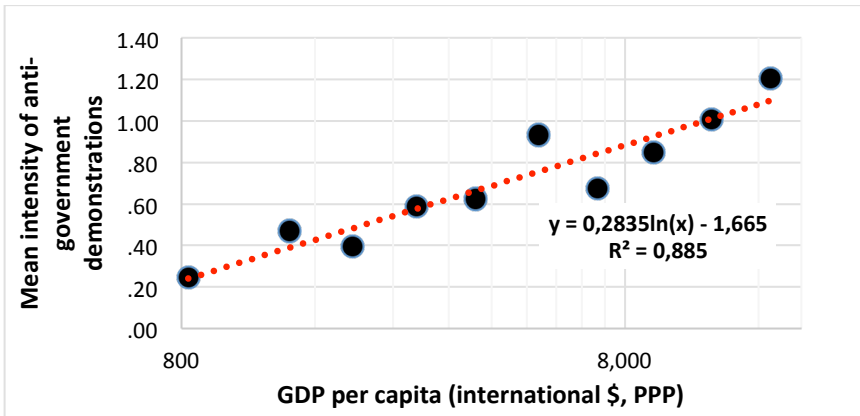
**Figure 26.** Mean intensity of anti-government demonstrations by income groups, 1960-2015. Source: CNTS database (Banks, Wilson 2017); World Bank 2017.

<sup>46</sup> A logarithmic regression.

<sup>47</sup> CNTS domestic 8 = Anti-government Demonstrations. The CNTS provides the following definition for anti-government demonstrations (domestic8): “any peaceful public gathering of at least 100 people for the primary purpose of displaying or voicing their opposition to government policies or authority, excluding demonstrations of a distinctly anti-foreign nature” (Wilson 2017: 13).



a) Natural X-axis scale



b) Logarithmic X-axis scale

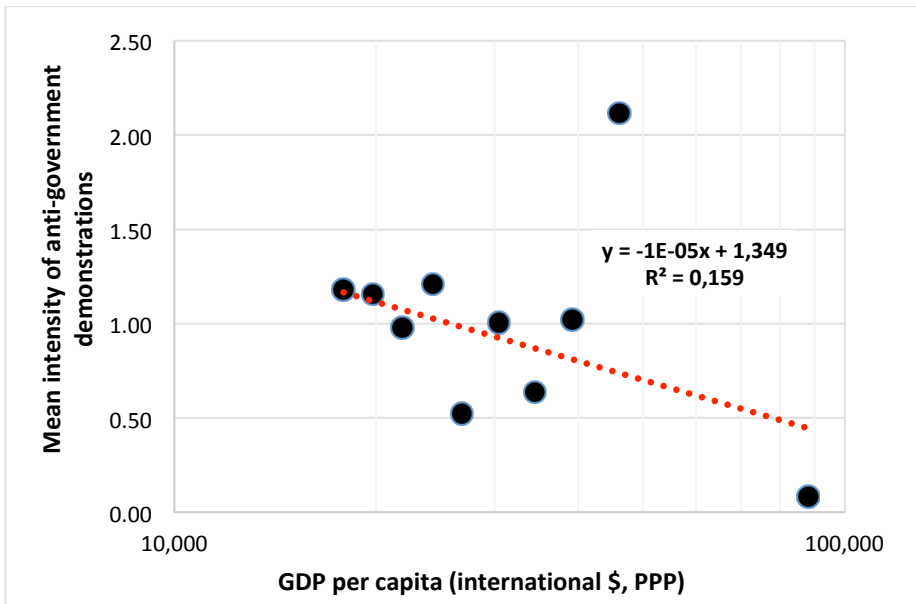
**Figure 27.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of anti-government demonstrations in respective years in the interval from the minimum to \$19,960<sup>48</sup>, 1960–2015<sup>49</sup>.  $r = 0.941$ ,  $p < 0.001$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

<sup>48</sup> Which corresponds to deciles from 1 to 8 of the general population of the database cases.

<sup>49</sup> Mean values of intensity of riots per decile for the interval from the minimum to \$19,969.

As we have found earlier (Korotayev, Bilyuga, and Shishkina 2016, 2017a, 2017b, and 2018), there is an extremely strong positive correlation between GDP per capita and intensity of anti-government demonstrations within the interval of GDP per capita values up to the level of \$20,000. This conclusion is supported by our new tests using the latest data (Figure 27a and b).

At the same time, anti-government demonstrations are an exceptional type of socio-political destabilization in the sense that (taking into account the latest data) there is no statistically significant negative correlation in the right part of the spectrum of GDP per capita values (Figure 28).

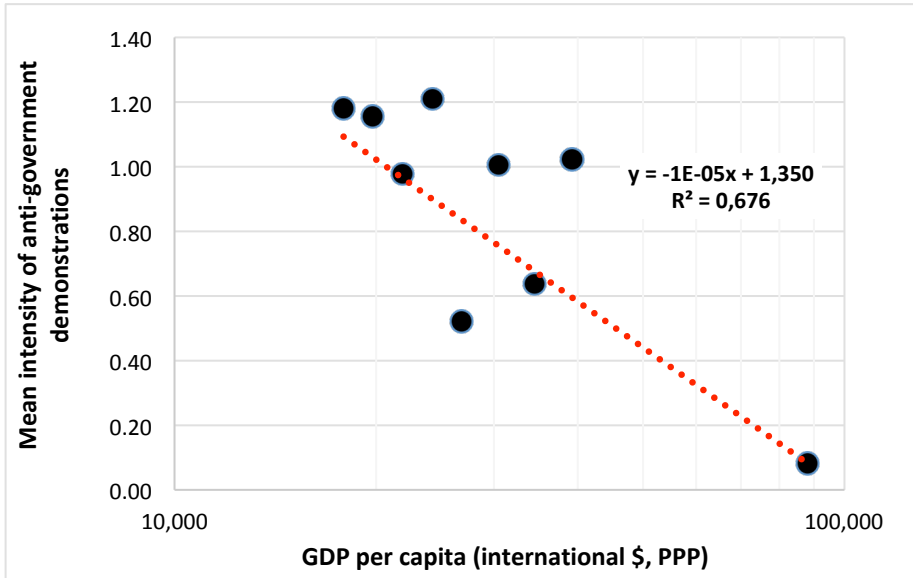


**Figure 28.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of anti-government demonstrations in respective years in the interval from \$17,000 to the maximum, 1960–2015<sup>50</sup>.  $r = -0.399$ ,  $p = 0.253$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017. For the boundary characteristics of the GDP per capita deciles see Supporting Online Materials.

However, a more accurate analysis indicates that the negative correlation is made here insignificant by the 9<sup>th</sup> decile, whereas this is connected with the fact that this decile contains the USA, which is characterized by unusually high (for a high

<sup>50</sup> Mean values of intensity of anti-government demonstrations per decile in the interval from \$17,000 to the maximum.

income country) intensity of demonstrations (as we see, a sort of “American exceptionalism” can be observed even here). With this outlier omitted, the negative correlation becomes considerably stronger and statistically significant (Figure 29). However, evidently, the USA is too significant an “exception” to be ignored.



**Figure 29.** Per decile correlation between GDP per capita (2011 international dollars, PPP) and intensity of anti-government demonstrations in respective years in the interval from \$17,000 to the maximum, 1960–2015<sup>51</sup>, excluding the outlier.  $r = -0.822$ ,  $p = 0.007$ . Source: CNTS database (Banks, Wilson 2017); World Bank 2017.

All in all, the following interpretation of the obtained results appears the most relevant: right up to the level of \$20,000 there is a very strong positive correlation between GDP per capita and intensity of anti-government demonstrations—that is, the growth of GDP per capita in this interval involves a distinct tendency towards the growth of intensity of anti-government demonstrations. Whatever the case, in this interval the fact is that the better people live, the more they take to the streets holding anti-government demonstrations (the result is paradoxical but not surprising in view of what has

<sup>51</sup> Mean values of intensity of anti-government demonstrations per decile for the interval from \$17,000 to the maximum.

been discussed in the first part of this article). At the same time, after reaching the GDP per capita threshold of about \$20,000, the further growth of GDP per capita is accompanied by a tendency toward the decrease in intensity of anti-government demonstrations, but this tendency cannot be regarded unequivocally as statistically significant.

## Discussion

Let us summarize some of the results of our tests. Firstly, consider the characteristics of the positive correlation in the left part of the spectrum of GDP per capita values (Table 1).

**Table 1.** Characteristics of positive correlations in the left part of the spectrum of GDP per capita values.

Types of destabilization	Max. interval (\$) of continuous positive correlation	Strength of positive correlation (r)	Significance of positive correlation (p)
Coups & Coup Attempts	<i>No positive correlation in the left part of the spectrum of GDP per capita values</i>		
Purges	5,300–6,400	0.340*	0.337
Assassinations	5,300–6,400	0.881*	0.001
Guerrilla Warfare	5,300–6,400	0.603*	0.033
Major Government Crises	10,300–13,500	0.820*	0.004
Riots	14,500–20,000	0.607*	0.032
General Strikes	10,300–14,500	0.930**	< 0.001
Anti-government Demonstrations	14,500–20,000	0.941**	< 0.001

\* linear regression

\*\* logarithmic regression

As one can see, different types of socio-political destabilization vary enormously as regards those characteristics. To start with, one finds at the opposite poles, on the one hand, coups and coup attempts (for which we find no positive correlation

at all in the left part of the GDP/capita spectrum) and, on the other hand, anti-government demonstrations (for which we find an extremely strong ( $r = 0.941!$ ) positive correlation in the left part of the spectrum). Next to coups and coup attempts one finds purges for which a positive correlation in the left part of the spectrum is observed, but it is very weak, statistically insignificant, and observed for a rather limited interval (that corresponds to low and lower-middle income countries, but not to upper-middle income economies).

The positive correlation between GDP/capita is also observed for the same limited interval with respect to the intensity of assassinations and guerrilla warfare. However, with respect to these two types of sociopolitical destabilization, the positive correlation is statistically significant (furthermore, in the case of assassinations this correlation is unequivocally strong).

A bit closer to the other pole, one finds major government crises, with respect to which a statistically significant strong positive correlation is observed not only for low and lower-middle income countries, but also for the lower echelon of the upper-middle income countries. For an even wider interval (including not only the lower echelon of upper-middle income countries, but also their upper echelon) one detects a statistically significant (but not very strong) positive correlation between GDP per capita and the intensity of riots.

Among the indicators that are very close to the pole that is opposite to the pole of coups and coup attempts, one should note general strikes, as they demonstrate an extremely strong ( $r = 0.93$ ) statistically significant positive correlation in the left part of the spectrum. However, it is observed for a shorter interval than in case of riots or anti-government demonstrations.

These are anti-government demonstrations that constitute the pole directly opposite to coups and coup attempts—due to an extremely strong positive correlation ( $r = 0.941$ ) and a very wide interval for which this correlation is observed (for an equally long interval the positive correlation in the left part of the spectrum is only observed for riots, but in the latter case we deal with a much weaker correlation).

Consider now characteristics of the negative correlation for the right part of the spectrum of GDP per capita values (Table 2).

It is easy to see that we are dealing here mainly with some kind of a “mirror image” of the left part of the spectrum (as one would indeed expect with respect to an inverted U-shaped relationship). Shorter intervals of the positive correlation correspond to longer intervals of the negative correlation, lower values of the positive correlation coefficient correspond to higher values of the negative correlation coefficient (although, of course, there are some exceptions).

At one pole, one finds again coups and coup attempts, for which an extremely strong ( $r = -0.946$ ) negative correlation is observed throughout the spectrum of GDP per capita values. Next to them we find again purges and assassinations, with respect to which a strong negative correlation (that is especially strong for

assassinations) is observed starting from rather low intervals (corresponding to the lower-middle income economies).

**Table 2.** Characteristics of negative correlations for the right part of the spectrum of GDP per capita values.

Types of destabilization	Starting interval (\$) of continuous negative correlation	Strength of negative correlation (r)	Significance of negative correlation (p)
Coups and Coup Attempts	<i>Negative correlation throughout GDP per capita values</i>	-0.946**	< 0.001
Assassinations	5,600–7,000	-0.953**	< 0.001
Purges	5,500–6,700	-0.793**	0.006
Major Government Crises	12,500–14,500	-0.855**	0.002
Guerrilla Warfare	13,500–17,000	-0.616**	0.029
Riots	21,700–24,800	-0.575**	0.082
General Strikes	23,000–25,000	-0.770**	0.010
Anti-government Demonstrations	<i>There is no statistically significant negative correlation in the right part of the spectrum. After \$20,000 there is no statistically significant correlation between GDP per capita and intensity of anti-government demonstrations</i>		

\* linear regression.

\*\* logarithmic regression.

Major government crises are characterized by an intermediate position. With respect to them, a negative correlation only appears starting from a rather high interval (corresponding to the upper echelon of upper-middle income countries), but at the same time this correlation is unambiguously strong ( $r = -0.855$ ; most other types of sociopolitical destabilization demonstrate much lower strength of the negative correlation coefficient). Regarding guerrilla warfare, a correlation is observed starting from an even higher interval (and it is much weaker ( $r = -0.616$ )). From an even higher interval (corresponding to the boundary between upper-middle income countries and high income ones) starts the negative correlation with riots; and in this case we are dealing with a rather weak and only marginally significant correlation. Finally, the negative correlation between GDP

per capita and intensity of general strikes is observed for high income countries only (however, this negative correlation is strong and statistically significant).

The pole directly opposite to coups and coup attempts is formed again by anti-government demonstrations as we do not find any statistically significant negative correlation between GDP/capita and anti-government demonstration intensity in the right part of the spectrum.

Let us examine now what intervals of GDP per capita are characterized by the maximum values of intensity of different types of socio-political destabilization—this index should be considered separately since in some cases (because of bimodality of a distribution) this interval is not identical with the interval up to which a continuous positive correlation is found.

**Table 3.** Intervals with maximum values of intensity of the corresponding types of socio-political destabilization.

Types of destabilization	Max. value interval	Corresponding income group
Coups and Coup Attempts	min - \$1,300	Low income countries
Purges	\$5,300 - \$6,400	Upper echelon of lower-middle income countries
Assassinations	\$5,300 - \$6,400	Upper echelon of lower-middle income countries
Major Government Crises	\$10,300 - \$14,500	Lower echelon of upper-middle income countries
Guerrilla Warfare	\$13,500 - \$17,000	Upper echelon of upper-middle income countries
Anti-government Demonstrations	\$17,000 - \$19,100	Upper echelon of upper-middle income countries
Riots	\$21,700 - \$24,800	Upper echelon of upper-middle income countries
General Strikes	\$23,000 - \$25,000	Upper echelon of upper-middle income countries—lower echelon of high income countries

As usual, coups and coup attempts occupy here a special position (their maximum intensity is observed for the countries with the lowest per capita incomes); they are followed by purges and assassinations, the maximum intensity of which is observed for the upper echelon of lower-middle income countries; major government crises are found next—their maximum intensity is observed for the lower echelon of high income economies. The upper echelon of upper-middle income countries is characterized by the maximum intensity of four types of socio-political destabilization: guerrilla warfare, anti-government demonstrations, riots, and general strikes. From our point of view, this fact must

be taken into account when explaining the phenomenon of the “middle income trap.”

### Regressions

A summary table of the characteristics of the correlations with GDP per capita for different types of socio-political destabilization looks as follows (Table 4a-c):

**Table 4a.** Summary table of the characteristics of positive correlation in the left part of the spectrum of GDP per capita values.

Types of destabilization	Max. interval (\$) of continuous positive correlation	r	p
Coups and Coup Attempts	<i>No positive correlation in the left part of the spectrum</i>		
Purges	5,300–6,400	0.340*	0.337
Assassinations	5,300–6,400	0.881*	0.001
Major Government Crises	10,300–13,500	0.820*	0.004
Guerrilla Warfare	5,300–6,400	0.603*	0.033
Riots	14,500–20,000	0.607*	0.032
General Strikes	10,300–14,500	0.93**	< 0.001
Anti-Government Demonstrations	14,500–20,000	0.941**	< 0.001

\* linear regression

\*\* logarithmic regression

**Table 4b.** Summary table of the characteristics of a negative correlation in the right part of the spectrum of GDP per capita values.

Types of destabilization	Starting interval (\$) of continuous negative correlation	r	p
Coups and Coup Attempts	<i>Negative correlation observed throughout</i>		
Purges	5,500–6,700	-0.793**	0.006
Assassinations	5,600–7,000	-0.953**	< 0.001
Major Government Crises	12,500–14,500	-0.855**	0.002
Guerrilla Warfare	13,500–17,000	-0.616**	0.029
Riots	21,700–24,800	-0.575**	0.082
General Strikes	23,000–25,000	-0.770**	0.01
Anti-Government Demonstrations	<i>No statistically significant negative correlation in the right part of the spectrum</i>		

\* linear regression

\*\* logarithmic regression

**Table 4c.** Intervals (\$) with the maximum mean intensity of respective types of socio-political destabilization.

Types of destabilization	Intervals (\$) with the maximum mean intensity of respective types of socio-political destabilization
Coups and Coup Attempts	
Purges	min – 1,300
Assassinations	5,300–6,400
Major Government Crises	5,300–6,400
Guerrilla Warfare	10,300–14,500
Riots	13,500–17,000
General Strikes	21,00 – 24,800
Anti-Government Demonstrations	23,000–25,000

To sum up, among the eight analyzed types of socio-political destabilization, coups and coup attempts occupy a very special position. This is the only type for which the inverted U-shaped relationship between GDP per capita and intensity of socio-political destabilization is not observed. We are dealing here with an extremely strong negative correlation between GDP per capita and intensity of coups and coup attempts which is observed throughout the whole spectrum of GDP per capita values. The maximum intensity of this indicator is recorded for the lowest income countries. Thus, for coups and coup attempts throughout the whole spectrum of GDP per capita values we observe a strong tendency towards a decrease in their intensity with the GDP per capita growth.

Next to coups and coup attempts we find purges, for which in the left part of the spectrum of GDP per capita values one detects a very limited interval (including low and lower-middle income countries only) with an extremely weak statistically insignificant positive correlation, whereas for the rest of the GDP/capita spectrum we find a strong negative correlation. As a result, we are dealing here with a weakly expressed asymmetric inverted U-shaped relationship with the strongest right-side skew when the strong negative correlation in the right part of the spectrum grossly outweighs the weak positive correlation in the left part. Thus, for purges we find a very weak tendency towards an increase with GDP per capita growth for low and lower-middle income countries and a strong tendency towards a decrease in intensity of purges with GDP per capita growth for upper-middle and high income countries.

In the case of assassinations, we are dealing with a definite inverted U-shaped relationship still with a prominent right-side asymmetry. There is a positive correlation in the left part of the spectrum in the same interval as for purges (that is, for low and lower-middle income countries), however, in this case the positive correlation is strong and statistically significant. Nevertheless, this time again the negative correlation in the right part of the spectrum (with respect to upper-

middle and high income countries) is much stronger than the positive correlation in its left part. Thus, with respect to assassinations we find a pronounced tendency towards an increase with GDP per capita growth for low and lower-middle income countries; however, for upper-middle and high income countries one detects an even more pronounced tendency towards a decrease in intensity of assassinations with GDP per capita growth.

Major government crises demonstrate a virtually symmetric inverted U-shaped relationship with GDP per capita with a strong (and significant) positive correlation in the left part as well as an equally strong (and significant) negative correlation in the right part of the spectrum. The peak of intensity is found here in the lower echelon of upper-middle income economies.

Such an important type of socio-political destabilization as guerrilla warfare is also characterized by a pronounced symmetry—there are moderately strong correlations (naturally with opposite signs) both in the left part or the right part of the spectrum. However, the peak of intensity is found here in a much higher interval of GDP per capita values (corresponding to the upper echelon of upper-middle income economies).

The other types of socio-political destabilization rather demonstrate a left-side asymmetry of the inverted U-shaped relationship (though to different extents).

With respect to riots, the positive correlation in the left part of the spectrum is just a little stronger than the negative correlation in its right part. However, a positive correlation is found here for a very wide range, from the lowest income countries to the upper echelon of upper-middle income economies, with the peak of intensity observed for a very high interval of GDP/capita values which is situated just next to the border between the upper echelon of upper-middle income countries and high income countries. In other words, an obvious (but not very marked) tendency towards the increase in intensity of riots with GDP per capita growth is observed right up to the upper echelon of upper-middle income countries (inclusive). A tendency towards the decrease in intensity of riots with GDP per capita growth is only found among high income countries, and this tendency is not very strong.

General strikes are characterized by an extremely strong positive correlation in the left part of the spectrum (up to the upper echelon of upper-middle income countries). A negative correlation in the right part of the spectrum is also pronounced but it is much weaker than a positive correlation and observed only among high income economies. Furthermore, the peak of the intensity occurs at the very border between the upper echelon of upper-middle income countries and high income countries. That is, in the interval up to \$14,500 there is a very marked tendency towards the increase in intensity of general strikes with GDP per capita growth; then, in the interval \$14,500 - \$23,000 the intensity of general strikes remains at a very high level but does not show a definite tendency

towards either the increase, or the decrease; the intensity of general strikes reaches the maximum at the border with high income countries, at the same time, among high income countries, there is a rather strong tendency towards the decrease in intensity of general strikes as GDP per capita grows further (however, this tendency is not as marked as an opposite one observed among low and middle income economies).

Finally, at the pole that is opposite to coups and coup attempts one finds anti-government demonstrations. Among the former, a negative correlation dominates (that is, we observe a sort of absolute right-side skew); among the latter, an inverted U-shaped relationship is also virtually absent, but here we are dealing with a left-hand skew that is close to absolute. Indeed, in the left part of the spectrum, in the interval up to \$20,000 (that corresponds to low and middle income countries) the strongest positive correlation ( $r = 0,941$ ) with GDP per capita is observed, whereas in the right part of the spectrum there is no statistically significant negative correlation. In other words, among low and middle income countries, we see the most pronounced tendency towards the increase in intensity of anti-government demonstrations with GDP per capita growth. Among high income countries, this tendency is not observed, but there is no significant opposite tendency as well, that is, among high income countries intensity of anti-government demonstrations remains very high on average.

## **Conclusion**

Our empirical tests support the Olson-Huntington hypothesis about the curvilinear inverted U-shaped relationship between the level of economic development and the level of socio-political instability. Up to certain values of per capita incomes, economic growth is accompanied by an increase in risks of socio-political destabilization. After per capita income reaches high values, further increases in the levels of economic development are accompanied by a decrease in risks of socio-political destabilization. Thus, higher values of income per capita are characterized by a negative correlation between income per capita and risks of socio-political destabilization, while for lower income modernizing economies we find a positive correlation.

Our analysis demonstrates that the curvilinear relationship has a different nature for different indices of socio-political destabilization. Our analysis also detects two important exceptions. Firstly, there is not a curvilinear, but marked negative correlation between GDP per capita and intensity of coups and coup attempts; at the same time, there is a particularly strong negative correlation between this index and the GDP per capita logarithm. The growth of GDP per capita is accompanied by the pronounced decrease in intensity of coups and coup attempts throughout the whole spectrum of GDP per capita values. This point makes the above mentioned curvilinear relationship less marked with respect to

the CNTS integral destabilization index and contributes to the formation of its “right-side” asymmetry (when the negative correlation between GDP per capita and socio-political instability among richer countries appears much stronger than the positive correlation for poorer countries).

Secondly, another exception is represented by anti-government demonstrations, for which we observe a marked tendency towards the increase in intensity with GDP per capita growth for low and middle income countries. However, we do not find a significant opposite tendency for high income countries.

On the other hand, our analysis reveals that for all the other indices of sociopolitical destabilization we find just the curvilinear inverted U-shaped relationship implied by Olson-Huntington hypothesis. Concerning such indices as general strikes, riots, and anti-government demonstrations, we deal with a “left-side” asymmetry that is directly opposite to the above mentioned “right-side” one—that is, we deal with such an asymmetry when a positive correlation between GDP per capita and instability for poorer countries is much stronger than a negative correlation for richer countries. This asymmetry is especially pronounced for anti-government demonstrations.

Thus, we arrive at the following conclusions: (1) Different types of political instability events have different functional relationships to changing levels of GDP/capita. Some do have a curvilinear response, others have a monotonic one. They also are more frequent at certain ranges of GDP/capita that are not the same, but rather are particular to certain types of events. (2) These findings show that certain types of events are more common at lower levels of income and political development, while others are more common at mid-levels, and yet others (anti-government protests, strikes) are more common at higher levels. (3) The functional relationships are most often linear in rising stages, but exponential or logarithmic in their declines. There are thus generally strong asymmetries in how such events react to changes in GDP/capita in the lower vs. upper ranges. (4) The overall notion of a curvilinear relationship between instability and GDP/capita is thus too simple, obscuring important patterns that reveal a trajectory of varying kinds of instability developing and peaking at different levels of economic development.

## **Acknowledgements**

This article is an output of a research project implemented as part of the Basic Research Program at the National Research University Higher School of Economics (HSE) in 2018 with support by the Russian Science Foundation (Project No. 18-18-00254).

## References

- Artzrouni M., and J. Komlos. 1985. "Population Growth through History and the Escape from the Malthusian Trap: A Homeostatic Simulation Model." *Genus* 41 (3-4): 21-39.
- Aiyar, S., R. Duval, D. Puy, Y. Wu, and L. Zhang. 2013. "Growth Slowdowns and the Middle-Income Trap." *IMF Working Papers* 13 (71): 1. doi: 10.5089/9781484330647.001.
- Banks, A. S. and K. A. Wilson. 2017. "Cross-National Time-Series Data Archive." *Databanks International*. Accessed May 24, 2017. <http://www.databanksinternational.com>.
- Boix, C. 2011. "Democracy, Development, and the International System." *American Political Science Review* 105 (4): 809-828. doi: 10.1017/s0003055411000402.
- Brunk, G. G., G. A. Caldeira, and M. S. Lewis-Beck. 1987. "Capitalism, socialism, and democracy: An empirical inquiry." *European Journal of Political Research* 15 (4): 459-470. doi: 10.1111/j.1475-6765.1987.tb00887.x.
- Burkhart, R. E., and M.S. Lewis-Beck. 1994. "Comparative Democracy: The Economic Development Thesis." *American Political Science Review* 88 (4): 903-910. doi: 10.2307/2082715.
- Cai, F. 2012. "Is There a 'Middle-Income Trap'? Theories, Experiences and Relevance to China." *China & World Economy* 20 (1): 49-61. doi: 10.1111/j.1749-124x.2012.01272.x.
- Chapman, T. and E. Reinhardt. 2013. "Global Credit Markets, Political Violence, and Politically Sustainable Risk Premia." *International Interactions: Empirical and Theoretical Research in International Relations* 39 (3): 316-342. doi: 10.1080/03050629.2013.782302.
- Clark, G. A. 2007. *Farewell to Alms: A Brief Economic History of the World*. Princeton, NJ: Princeton University Press.
- Collier, P. 2007. *The Bottom Billion*. Oxford: Oxford University Press.
- Collier, P. and A. Hoeffler. 2004. "Greed and grievance in civil war." *Oxford Economic Papers* 56 (4): 563-595. doi: 10.1093/oep/gpf064.
- Cutright, P. 1963. *National Political Development: Social and Economic Correlates. Politics and Social Life: An Introduction to Political Behavior*, edited by Nelson W. Polsby, Robert A. Dentler, and Paul A. Smith. Boston: Houghton Mifflin.
- Dahl, R. A. 1971. *Polyarchy: Participation and Opposition*. New Haven: Yale University Press.
- DiGiuseppe M. R., C. M. Barry, and R. W. Frank. 2012. "Good for the money: International finance, state capacity, and internal armed conflict." *Journal of Peace Research* 49 (3): 391-405. doi: 10.1177/0022343311434239.

- Epstein, D. L., R. Bates, J. Goldstone, I. Kristensen, and S. O'Halloran. 2006. "Democratic transitions." *American Journal of Political Science* 50 (3): 551–569. doi: 10.1111/j.1540-5907.2006.00201.x.
- Evans, M.D.R. and Kelley, J. 2017. Communism, Capitalism, and Images of Class: Effects of Reference Groups, Reality, and Regime in 43 Nations and 110,000 Individuals, 1987-2009. *Cross-Cultural Research* 51(4):315-359. doi: 10.1177/1069397116677963.
- Gates, S., H. Hegre, M. P. Jones, and H. Strand. 2000. "Institutional consistency and Political Instability: Persistence and Change in Political Systems Revisited, 1800-1998." Paper presented at the annual meeting of American Political Science Association. Washington D. C.
- Goldstone, J. A. 1991. *Revolution and rebellion in the early modern world*. Berkeley, CA: Univ. of California Press.
- Goldstone, J. A. 1993. "Predicting Revolutions: Why We Could (and Should) have Foreseen the Revolutions of 1989-1991 in the U.S.S.R. and Eastern Europe." *Contention* 2 (2): 127–152.
- Goldstone, J. A. 2002. "Population and Security: How Demographic Change Can Lead to Violent Conflict." *Journal of International Affairs* 56 (1): 3–21. <http://www.jstor.org/stable/24357881>.
- Goldstone, J. 2014a. "Protests in Ukraine, Thailand and Venezuela: What unites them?" *Russia Direct*. Accessed May 15, 2014.
- Goldstone, J. 2014b. *Revolutions. A Very Short Introduction*. Oxford: Oxford University Press.
- Goldstone, J. A., R. H. Bates, D. L. Epstein, T. R. Gurr, M. G. Marshall, M. B. Lustik, M. Woodward, and J. Ulfelder. 2010. "A global model for forecasting political instability." *American Journal of Political Science* 54 (1): 190–208. doi: 10.1111/j.1540-5907.2009.00426.x.
- Goldstone, J. A., T. R. Gurr, B. Harff, M. A. Levy, M. G. Marshall, R. H. Bates, D. L. Epstein, C. H. Kahl, P. T. Surko, J. C. Ulfelder, Unger Jr., and A. N. Unger. 2000. "State Failure Task Force Report: Phase III Findings." Harvard Kennedy School. Accessed May 28, 2018. <https://sites.hks.harvard.edu/fs/pnorris/Acrobat/stm103%20articles/StateFailureReport.pdf>.
- Grinin, L. E., L. M. Issaev, and A. V. Korotayev. 2015. *Revolutsii i nestabil'nost' na Blizhnem Vostoke [Revolutions and Instability on the Near East]*. Moscow: Uchitel'.
- Grinin, L. E., and A. V. Korotayev. 2009. "Urbanizatsiia i politicheskaiia nestabil'nost': k razrabotke matematicheskikh modelei politicheskikh protsessov [Urbanization and Political Instability: to the Development of Mathematical Models of Political Processes]." *Politicheskie issledovaniia [Political Studies]* 4: 34–52.
- Grinin, L. E., A. V. Korotayev, and S. Iu. Malkov. 2008. "Matematicheskie modeli sotsial'no-demograficheskikh tsiklov i vykhoda iz 'mal'tuzianskoi lovushki:

- nekotorye vozmozhnye napravleniia dal'neishego razvitiia. [Mathematical Models of Socio-Demographic Cycles and the Escape from the Malthusian Trap: Some Possible Directions of Further Development].” In *Problemy matematicheskoi istorii. Matematicheskoe modelirovanie istoricheskikh protsessov* [The Problems of Mathematical History. Mathematical Modelling of Historical processes], edited by G.G. Malinetskii, and A.V. Korotayev, 78117. Moscow: Izdatel'stvo LKI/URSS.
- Grinin, L. E., A. V. Korotayev, and S. Iu. Malkov. 2010. “Istoriia, Matematika i nekotorye itogi diskussii o prichinakh Russkoi revoliutsii [History, Mathematics and Some Results of the Discussion on the Causes of Russian Revolution].” In *Oprichinakh Russkoi revoliutsii. [On the Causes of Russian Revolution]*, edited by L.E. Grinin, A.V. Korotayev, and S. Iu Malkov, 368–427. Moscow: Izdatel'stvo LKI/URS.
- Grinin, L. E., S. Iu. Malkov, V. A. Gusev, and A. V. Korotayev. 2009. “Nekotorye vozmozhnye napravleniia razvitiia teorii sotsial'no-demograficheskikh tsiklov i matematicheskie modeli vykhoda iz «mal'tuzianskoi lovushki» [Possible Directions for Further Development of Socio-Demographic Cycles Theory and Mathematical Models of the Escape from the Malthusian Trap].” In *Istoriia i Matematika: protsessy i modeli [History & Mathematics: Processes & Models]*, edited by S. Iu. Malkov, L. E. Grinin., and A. V. Korotayev, 134–210. Moscow: URSS.
- Grinin, L. E, and A. V. Korotayev. 2012. “Does ‘Arab Spring’ Mean the Beginning of World System Reconfiguration?” *World Futures* 68 (7): 471–505. doi: 10.1080/02604027.2012.697836.
- Grinin, L. E., and A. V. Korotayev. 2012. *Tsikly, krizisy, lovushki sovremennoi Mir-Sistemy. Issledovanie kondrat'evskikh, zhiugliarovskikh i vekovykh tsiklov, global'nykh krizisov, mal'tuzianskikh i postmal'tuzianskikh lovushek* [Cycles, Crises and Traps of the Modern World System]. Moscow: URSS.
- Grinin, L. E., and A. V. Korotayev. 2013. “Demokratiia i revoliutsiia [Democracy and Revolution].” *Istoriia i sovremennost' [History & Modernity]* 2: 15–35.
- Grinin, L., and A. V. Korotayev. 2014a. “Revolution and Democracy in the Context of the Globalization.” In *Dialectics of Modernity - Recognizing Globalization. Studies on the Theoretical Perspectives of Globalization*, edited by E. Kiss, 184–207. Budapest: Arisztotelész Kiadó (Publisherhouse Arostotelész).
- Grinin, L. E., and A. V. Korotayev. 2014b. “Revoliutsiia vs demokratiia [Revolution vs. Democracy].” *Polis* 3 (5): 139–158.
- Grinin, L. E., S. Tsirel, and A. V. Korotayev. 2015. “Will the explosive growth of China continue?” *Technological Forecasting and Social Change* 95: 294–308. doi: 10.1016/j.techfore.2014.06.023.
- Groves, A. 2016. “Discuss and Evaluate the Relationship between Poverty and Terrorism.” E-International Relations. Accessed May 16, 2016. <http://www.e->

- ir.info/2008/01/04/discuss-and-evaluate-the-relationship-between-poverty-and-terrorism/.
- Gurr, T. R. 1974. "Persistence and Change in Political Systems, 1800-1971." *American Political Science* 68 (4): 1482-1504. doi: 10.2307/1959937.
- Hegre, H., and N. Sambanis. 2006. "Sensitivity Analysis of Empirical Results on Civil War Onset." *Journal of Conflict Resolution* 50 (4): 508-535. doi: 10.1177/0022002706289303
- Huntington, S. 1968. *Political order in changing societies*. New Haven, CT: Yale University Press.
- Jenkins, J. C., and M. Wallace. 1996. "The generalized action potential of protest movements: The new class, social trends, and political exclusion explanations." *Sociological Forum* 11 (2): 183-207. doi: 10.1007/bf02408364.
- Kharas, H., and H. Kohli. 2011. "What is the Middle Income Trap, Why do Countries Fall into It, and How Can It Be Avoided?" *Global Journal of Emerging Market Economies* 3 (3): 281-289. doi: 10.1177/097491011100300302.
- Khlebnikov, A. 2016. Why did the 2011 Egyptian Revolution Fail? *Central European Journal of International and Security Studies* 10(3): 88-117.
- Kiendrebeogo, Y., and E. Ianchovichina. 2016. "Who Supports Violent Extremism in Developing Countries? Analysis of Attitudes Based on Value Surveys." *Policy Research Working Paper*. Accessed May 20, 2016. [http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2016/06/02/090224b08438a637/2\\_0/Rendered/PDF/Who0supports0v0sed0on0val ue0surveys.pdf](http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2016/06/02/090224b08438a637/2_0/Rendered/PDF/Who0supports0v0sed0on0val ue0surveys.pdf).
- Knutsen, C. H. 2014. "Income Growth and Revolutions." *Social Science Quarterly* 95 (4): 920-937. doi: 10.1111/ssqu.12081.
- Kögel, T., and A. Prskawetz. 2001. "Agricultural Productivity Growth and Escape from the Malthusian Trap." *Journal of Economic Growth* 6: 337-357. doi: 10.1023/A:1012742531003.
- Kohli, H. A., and N. Mukherjee. 2011. "Potential costs to Asia of the Middle Income Trap." *Global Journal of Emerging Market Economies* 3 (3): 291-311. doi: 10.1177/097491011100300303.
- Komlos, J., and M. Artzrouni. 1990. "Mathematical Investigations of the Escape from the Malthusian Trap." *Mathematical Population Studies* 2 (4): 269-287. doi: 10.1080/08898489009525313.
- Komlos, J., and S. Nefedov. 2002. "A compact macromodel of pre-industrial population growth." *Historical Methods: A Journal of Quantitative and Interdisciplinary History* 35 (2): 92-94. doi: 10.1080/01615440209604133.
- Korotayev, A. V. 2009. "Compact mathematical models of the World System development and their applicability to the development of local solutions in Third World countries." In *Systemic Development: Local Solutions in a Global Environment*, edited by J. Sheffield, 103-116. Litchfield Park, AZ: ISCE Publishing.

- Korotayev, A. V. 2012. "Lovushka na vykhode iz lovushki. K matematicheskomu modelirovaniuu sotsial'no-politicheskoi destabilizatsii v stranakh mir-sistemnoi periferii [A Trap at the Escape From the Trap. On the Mathematical Modeling of Socio-Political Destabilization in the Countries of the World-System Periphery]." In *Sotsiologiya i obshchestvo: global'nye vyzovy i regional'noe razvitie [Sociology and Society: Global Challenges and Regional Development]*, edited by Zh. T. Toshchenko, 1483–1489. Moscow: RSO.
- Korotayev, A. V. 2014. "Technological Growth and Sociopolitical Destabilization: A Trap at the Escape from the Trap?" In *Socio-Economic and Technological Innovations: Mechanisms and Institutions*, edited by K. Mandal, V. Asheulova, and S. G. Kirdina, 113–134. New Delhi: Narosa Publishing House.
- Korotayev, A. V., S. E. Bilyuga, and A. R. Shishkina. 2016. "VVP na dushu naseleniia, uroven' protestnoi aktivnosti i tip rezhima: opyt kolichestvennogo analiza [GDP per Capita, Protest Intensity and Regime Type: a Quantitative Analysis]." *Sravnitel'naia politika [Comparative Politics Russia]* 7(4): 72–94. doi: 10.18611/2221-3279-2016-7-4(25)-72-94.
- Korotayev, A. V., S. E. Bilyuga, and A. R. Shishkina. 2017a. "VVP na dushu naseleniia, intensivnost' antipravitel'stvennykh demonstratsii i uroven' obrazovaniia: kross-natsional'nyi analiz [GDP per Capita, Anti-Government Demonstrations Intensity and Level of Education: Cross-National Analysis]." *Politiia: Analiz. Khronika. Prognoz [Politeia. Analysis. Chronicle. Forecast ]* 1 (84): 127–143. doi: 10.1177/1069397117732328.
- Korotayev, A. V., S. E. Bilyuga, and A. R. Shishkina. 2017b. "Ekonomicheskii rost i sotsial'no-politicheskaiia destabilizatsiia: opyt global'nogo analiza [Economic Growth and Socio-Political Destabilization: A Global Analysis]." *Polis* 2: 155–169.
- Korotayev, A. V., S. E. Bilyuga, and A. R. Shishkina. 2018. "GDP Per Capita and Protest Activity: A Quantitative Reanalysis." *Cross-Cultural Research* 60: 1–35. doi: 10.1177/1069397117732328.
- Korotayev, A. V., L. E. Grinin, Iu. V. Bozhevol'nov, J. V. Zinkina, and S. Iu. Malkov. 2011. "Lovushka na vykhode iz lovushki. Logicheskie i matematicheskie modeli [A Trap on the Escape from the Trap. Logical and Mathematical Modeling]." In *Proekty i riski budushchego. Kontseptsii, modeli, instrumenty, prognozy [The Projects and Risks of the Future. Concepts, Models, Instruments, Forecasts]*, edited by A. A. Akaev, A. V. Korotayev, G. G. Malinetskii, and S. Iu. Malkov, 138–164. Moscow: Krasand/URSS.
- Korotayev, A. V., L. E. Grinin, D. A. Khalturina, A. S. Malkov, J. V. Bozhevol'nov, S. V. Kobzeva, J. V. Zinkina, and S. Iu. Malkov. 2010. "Lovushka na vykhode iz lovushki? K prognozirovaniuu dinamiki politicheskoi nestabil'nosti v stranakh Afriki na period do 2050 g. [A Trap at the Escape from the Trap? Towards the Forecasting of the Risks of Political Instability in the African Countries over the period till 2050]." In *Zakony istorii: matematicheskoe modelirovanie i*

- prognozirovaniye mirovogo i regional'nogo razvitiia* [Laws of History. Mathematical Modeling and Forecasting of World and Regional Development], edited by A. V. Korotayev, Iu. V. Zinkina, 159–226. Moscow: LKI/URSS.
- Korotayev, A. V., L. M. Issaev, S. Y. Malkov, and A. R. Shishkina. 2013. "Developing the Methods of Estimation and Forecasting the Arab Spring." *Central European Journal of International and Security Studies* 7 (4): 28–58.
- Korotayev, A. V., L. M. Issaev, S. Y. Malkov, and A. R. Shishkina. 2014. "The Arab Spring: A Quantitative Analysis." *Arab Studies Quarterly* 36 (2): 149–169. doi: 10.13169/arabstudquar.36.2.0149.
- Korotayev, A. V., L. M. Issaev, and A. M. Vasiliev. 2015. "Kolichestvennyi analiz revoliutsionnoi volny 2013–2014 gg [A Quantitative Analysis of the Revolutionary Wave of 2013–2014]." *Sotsiologicheskie issledovaniia* [Sociological Research] 8 (376): 119–127.
- Korotayev, A., L. Issaev, and J. Zinkina. 2015. "Center-Periphery Dissonance as a Possible Factor of the Revolutionary Wave of 2013–2014: A Cross-National analysis." *Cross-Cultural Research* 49 (5): 461–488. doi: 10.1177/1069397115595374.
- Korotayev, A. V., D. A. Khalturina, S. V. Kobzeva, and J. V. Zinkina. 2011. "Lovushka na vykhode iz lovushki? O nekotorykh osobennostiakh politiko-demograficheskoi dinamiki moderniziruiushchikhsia sistem. [A Trap at the Escape on the Trap. About some Features of Political-Demographic Dynamics of the Modernizing Societies]." In *Proekty i riski budushchego. Kontseptsii, modeli, instrumenty, prognozy* [The Projects and Risks of the Future. Concepts, Models, Instruments, Forecasts] edited by A. A. Akaev, A. V. Korotayev, G. G. Malinetskii, and S. Iu. Malkov, 45–88. Moscow: Krasand/URSS.
- Korotayev, A. V., A. S. Khodunov, A. N. Burova, S. Iu. Malkov, D. A. Khalturina, and J. V. Zinkina. 2012. "Sotsial'no-demograficheskii analiz Arabskoi vesny [Socio-Demographic Analysis of the Arab Spring]." In *Arabskaia vesna 2011 goda. Sistemnyi monitoring global'nykh i regional'nykh riskov* [The Arab Spring of 2011. The System Monitoring of Global and Regional Risks], edited by A. V. Korotayev, J. V. Zinkina, and A. S. Khodunov, 28–76. Moscow: LIBROKOM/URSS.
- Korotayev, A. V., A. S. Malkov, and D. A. Khalturina. 2007. *Zakony istorii: Matematicheskoe modelirovaniye razvitiia Mir-Sistemy. Demografiia, ekonomika, kul'tura* [Laws of History: Mathematical Simulation of the Development of the World System: Demography, Economics, Culture]. Moscow: KomKniga/URSS.
- Korotayev, A. V., and S. Iu. Malkov. 2014. "Lovushka na vykhode iz mal'tuzianskoi lovushki v sovremennykh moderniziruiushchikhsia obshchestvakh [A Trap at the Escape for the Malthusian Trap in the Contemporary Modernizing Societies]." *Istoriia i matematika* [History & Mathematics] 9: 43–98.

- Korotayev, A. V., S. Iu. Malkov, A. N. Burova, J. V. Zinkina, and A. S. Khodunov. 2012. "Lovushka na vykhode iz lovushki. Matematicheskoe modelirovanie sotsial'no-politicheskoi destabilizatsii v stranakh mir-sistemnoi periferii i sobytiia Arabskoi vesny 2011 g [A Trap at the Escape from the Trap. Mathematical Modeling of the Socio-Political Destabilization in the Countries of the World-System Periphery and the Events of the Arab Spring of 2011]." In *Modelirovanie i prognozirovanie global'nogo, regional'nogo i natsional'nogo razvitiia [Modeling and Forecasting of the Global, Regional and National Development]*, edited by A. A. Akaev, A. V. Korotayev, G. G. Malinetskii, S. Iu. Malkov, 210-276. Moscow: LIBROKOM/URSS.
- Korotayev, A. V., E. V. Slinko, S. G. Shul'gin, and S. E. Bilyuga. 2016. "Promezhutochnye tipy sotsial'no-politicheskikh rezhimov i sotsial'no-politicheskaiia nestabil'nost': opyt kolichestvennogo kross-natsional'nogo analiza. [Intermediate Types of Socio-Political Regimes and Political Instability: A Quantitative Cross-National Analysis]." *Politiia: Analiz. Khronika. Prognoz [Politeia. Analysis. Chronicle. Forecast]* 3: 31–51.
- Korotayev, A. V., and J. V. Zinkina. 2010a. "K prognozirovaniiu dinamiki politicheskoi nestabil'nosti v stranakh Afriki na period do 2050 g [Forecasting of Dynamics of Political Instability in the Countries of Africa on the Period till 2050]." In *Dinamika afrikanskikh obshchestv: zakonomernosti, tendentsii, perspektivy [Dynamics of African Societies: patterns, tendencies, perspectives]*, edited by A. D. Savateev, and I. V. Sledzevskii, 65–80. Moscow: RGGU.
- Korotayev, A. V., and J. V. Zinkina. 2010b. "Prognozirovanie sotsiopoliticheskikh riskov: lovushka na vykhode iz mal'tuzianskoi lovushki [Forecasts of Socio-Political Risks: A Trap at the Escape of the Malthusian Trap]." *Informatsionnyi biulleten' Assotsiatsii «Istoriia i komp'iuter» [Information Bulletin of History and Computer Association]* 36: 101–103.
- Korotayev, A. V., and J. V. Zinkina. 2011a. "Demograficheskie korni Egiptskoi revoliutsii [The Demographic Roots of the Egyptian Revolution]." *Demoskop [Demoscope]*. Accessed May 24, 2016. <http://www.demoscope.ru/weekly/2011/0459/tema01.php>.
- Korotayev, A. V., and J. V. Zinkina. 2011b. "Egiptskaiia revoliutsiia 2011 g [The Egyptian Revolution of 2011]." *Aziia i Afrika segodnia [Asia and Africa Today]* 6 (647): 10–16.
- Korotayev, A. V., and J. V. Zinkina. 2011c. "Egiptskaiia revoliutsiia 2011 goda: sotsiodemograficheskii analiz [The Egyptian Revolution of 2011: Socio-Demographic Analysis]." *Istoriicheskaiia psikhologiya i sotsiologiya istorii [Historical Psychology & Sociology of History]* 4 (2): 5–29.
- Korotayev, A., and J. Zinkina. 2011d. "Egyptian Revolution: A Demographic Structural Analysis." *Entelequia. Revista Interdisciplinar* 13: 139–169.
- Korotayev, A. V., and J. V. Zinkina. 2012a. "Strukturno-demograficheskie faktory «arabskoi vesny» [Structural-Demographic Factors of the Arab Spring]." In

*Protestnye dvizheniia v arabskikh stranakh. Predposylki, osobennosti, perspektivy* [Protests Movements in the Arab Countries. Preliminaries, Features, Perspectives], edited by I. V. Sledzevskii, and A. D. Savateev, 28–40. Moscow: Librokom/URSS.

- Korotayev, A. V., and J. V. Zinkina. 2012b. "Tropicheskaia Afrika v mal'tuzianskoi lovushke? K modelirovaniu i prognozirovaniu sotsial'no-demograficheskogo razvitiia Afriki iuzhnee Sakhary [Tropical Africa in the Malthusian Trap? Modeling and Forecasting of Socio-Demographic Development of the Africa Sub-Saharan Africa]." *Informatsionnyi biulleten' Assotsiatsii «Istoriia i komp'uter»* [Information Bulletin of History and Computer] 38: 77–79.
- Korotayev, A. V., and J. V. Zinkina. 2013. "Kak optimizirovat' rozhdaiemost' i predotvratit' gumanitarnye katastrofy v stranakh Tropicheskoi Afriki [How to Optimize Fertility and Prevent Humanitarian Catastrophes in Tropical Africa]." *Aziia i Afrika segodnia* [Asia and Africa Today] 4: 28–35.
- Korotayev, A. V., and J. V. Zinkina. 2014. *O snizhenii rozhdaiemosti kak uslovii sotsial'no-ekonomicheskoi stabil'nosti v naimenee razvitykh stranakh. Mirovaia dinamika: zakonomernosti, tendentsii, perspektivy* [World Dynamics: Patterns, Tendencies, Perspectives], edited by A. A. Akaev, A. V. Korotayev, and S. Iu. Malkov. 243–263. Moscow: Krasand/URSS.
- Korotayev, A., and J. Zinkina. 2015. "East Africa in the Malthusian Trap?" *Journal of Developing Societies* 31 (3): 1–36. doi: 10.1177/0169796x15590322.
- Korotayev, A., J. Zinkina, S. Kobzeva, J. Bogevolnov, D. Khaltourina, A. Malkov, and S. Malkov. 2011. "A Trap at the Escape from the Trap? Demographic-Structural Factors of Political Instability in Modern Africa and West Asia." *Clodynamics: The Journal of Theoretical and Mathematical History* 2 (2): 276–303. <https://escholarship.org/uc/item/79t737gt>.
- Lipset, S. M. 1959. "Some Social Requisites of Democracy: Economic Development and Political Legitimacy." *American Political Science Review* 53 (1): 69–105. doi: 10.2307/1951731.
- Londregan, J. B., and K. T. Poole. 1996. "Does High Income Promote Democracy?" *World Politics* 49 (1): 1–30. doi: 10.1353/wp.1996.0024.
- MacCulloch, R. 2004. "The Impact of Income on the Taste for Revolt." *American Journal of Political Science* 48 (4): 830–848. doi: 10.2139/ssrn.307423.
- MacCulloch, R., and S. Pezzini. 2010. "The Role of Freedom, Growth and Religion in the Taste for Revolution." *The Journal of Law & Economics* 53 (2): 329–358. doi: 10.1086/605093.
- Malkov, S. Iu., A. V. Korotayev, L. M. Issaev, and E. V. Kuz'minova. 2013. "O metodike otsenki tekushchego sostoiianiia i prognoza sotsial'noi nestabil'nosti: opyt kolichestvennogo analiza sobytii Arabskoi vesny [On methods of estimating current condition and of forecasting social instability: attempted quantitative analysis of the events of the Arab spring]." *Polis. Politicheskie issledovaniia* [Polis. Political Studies] 4: 137–162.

- Mansfield, E., and J. Snyder. 1995. "Democratization and the Danger of War." *International Security* 20 (1): 5–38. doi: 10.2307/2539213.
- Marshall, M. G., and B. R. Cole. 2008. "A Macro-Comparative Analysis of the Problem of Factionalism in Emerging Democracies." Paper presented at the 2008 annual meeting of the American Political Science Association. APSA.
- Miguel, E., S. Satyanath, and E. Sergenti. 2004. "Economic Shocks and Civil Conflict: An Instrumental Variables Approach." *Journal of Political Economy* 112 (4): 725–753. doi: 10.1086/421174.
- Miljkovic, D., and A. Rimal. 2008. "The Impact of Socio-Economic Factors on Political Instability: A Cross-Country Analysis." *The Journal of Socio-Economics* 37 (6): 2454–2463. doi: 10.1016/j.socsec.2008.04.007.
- Moore, B. 1966. *Social Origins of Dictatorship and Democracy*. Boston: Beacon Press.
- Nafziger, E. W., and J. Auvinen. 2002. "Economic Development, Inequality, War, and State Violence." *World Development* 30 (2): 153–163. doi: 10.1016/s0305-750x(01)00108-5.
- Nafziger, E. W., and J. Auvinen. 2003. *Economic Development, Inequality and War: Humanitarian Emergencies in Developing Countries*. New York, NY: Springer.
- Nefedov, S. 2004. "A model of demographic cycles in a traditional society: the case of Ancient China." *Social Evolution & History* 3 (1), 69–80.
- Nefedov, S. A. 2013. "Modeling Malthusian Dynamics in Pre-Industrial Societies." *Cliodynamics: The Journal of Theoretical and Mathematical History* 4 (2): 229–240. <https://escholarship.org/uc/item/71g00580>.
- Nefedov S. A. 2015. Debate on the Population Well-Being and the Russian Revolution. *Social Evolution and History* 14(1): 116–124.
- Nijs, D. E. 2015. Introduction: Coping with Growing Complexity in Society. *World Futures* 71(1-2): 1-7. doi: 10.1080/02604027.2015.1087223
- Nilsson M. and Silander D. 2016. Democracy and security in the EU's eastern neighborhood? Assessing the ENP in Georgia, Moldova, and Ukraine. *Democracy and Security* 12(1): 44-61. doi: 10.1080/17419166.2015.1135744
- Olson, M. 1963. "Rapid Growth as a Destabilizing Force." *The Journal of Economic History* 23 (4): 529–552. doi: 10.1017/s0022050700109210.
- Parvin, M. 1973. "Economic Determinants of Political Unrest: An Econometric Approach." *Journal of Conflict Resolution* 17 (2): 271–291. doi: 10.1177/002200277301700205.
- Rueschemeyer, D., E. H. Stephens, and J. D. Stephens. 1992. *Capitalist Development and Democracy*. Chicago: University of Chicago Press.
- Slinko E., S. Bilyuga, J. Zinkina, and A. Korotayev. 2017. "Regime Type and Political Destabilization in Cross-National Perspective: A Re-Analysis." *Cross-Cultural Research* 51 (1): 26–50. doi: 10.1177/1069397116676485.

- Smith, B. 2004. "Oil Wealth and Regime Survival in the Developing World, 1960-1999." *American Journal of Political Science* 48 (2): 232-246. doi: 10.1111/j.0092-5853.2004.00067.x.
- Steinmann, G., A. Prskawetz, and G. Feichtinger. 1998. "A Model on the Escape from the Malthusian Trap." *Journal of Population Economics* 11 (4): 535-550. doi: 10.1007/s001480050083.
- The World Bank and the Development Research Center of the State Council of the People's Republic of China. 2012. *China 2030. Building a Modern, Harmonious, and Creative High-Income Society*. Washington: International Bank for Reconstruction and Development.
- Tsirel, S. V. 2012a. "Revolyutsii, volny revolyutsij i Arabskaya vesna. Arabskaya vesna 2011 goda [Revolution, a Wave of Revolutions and the Arab Spring. Arab Spring 2011]." In *Sistemnyj monitoring global'nykh i regional'nykh riskov [System Monitoring Global and Regional Risk]*, edited by A. Korotayev, J. Zinkina, and A. Khodunov. Moscow, Russia: LIBROKOM/URSS.
- Tsirel, S. V. 2012b. "Usloviya vozniknoveniya revolyucionnykh situatsij v arabskikh stranakh. Arabskaya vesna 2011 goda [Terms Emergence of Revolutionary Situations in the Arab World. Arab spring 2011]." In *Sistemnyj monitoring global'nykh i regional'nykh riskov [System Monitoring Global and Regional Risk]*, edited by A. Korotayev, J. Zinkina, & A. Khodunov. Moscow, Russia: LIBROKOM/URSS.
- Turchin, P. 2003. *Historical Dynamics: Why States Rise and Fall*. Princeton, NJ: Princeton University Press.
- Turchin, P. 2005. *War and Peace and War: Life Cycles of Imperial Nations*. New York: Pi Press.
- Turchin, P. 2009. "Long-Term Population Cycles in Human Societies." *Annals of the New York Academy of Sciences* 1162 (1): 1-17. doi: 10.1111/j.1749-6632.2009.04447.x.
- Turchin, P. 2013. "Modeling Social Pressures Toward Political Instability." *Cliodynamics: The Journal of Theoretical and Mathematical History* 4 (2): 241-290. <https://escholarship.org/uc/item/6qp8x28p>.
- Turchin, P. 2016. *Ages of Discord: A Structural-Demographic Analysis of American History*. Chaplin, CT: Beresta.
- Turchin, P., and A. Korotayev. 2006. "Population Density and Warfare: A Reconsideration." *Social Evolution & History* 5 (2): 121-158.
- Turchin, P., and S. A. Nefedov. 2009. *Secular Cycles*. Princeton University Press.
- Ulfelder, J., and M. Lustik. 2007. "Modelling Transitions to and from Democracy." *Democratization* 14: 351-387. doi: 10.1080/13510340701303196.
- Urnov, M. Iu. 2008. *Emotsii v politicheskom povedenii [Emotions in Political Behavior]*. Moscow: Aspekt-Press.
- Vreeland, J. R. 2008. "The Effect of Political Regime on Civil War." *Journal of Conflict Resolution* 52 (3): 401-425. doi: 10.1177/0022002708315594.

- Weede, E. 1981. "Income Inequality, Average Income, and Domestic Violence." *The Journal of Conflict Resolution* 25 (4): 639–654. <http://www.jstor.org/stable/173913>.
- Wilson, K. 2017. "User's Manual." In *Cross-National Time-Series Data Archive*. Jerusalem: Databanks International. Accessed May 31, 2018. <https://www.cntsdata.com/>.
- World Bank. 2017a. "GDP per capita, PPP (Constant 2011 International \$)." World Development Indicators Online. Washington DC: World Bank. Accessed May 24, 2017. <http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD>.
- World Bank. 2017b. "GDP per capita growth (Annual %)." World Development Indicators Online. Washington DC: World Bank. Accessed May 24, 2017. <http://data.worldbank.org/indicator/NY.GDP.PCAP.KD.ZG>.
- World Bank. 2017c. "World Bank Atlas Method." Accessed May 24, 2017. <https://datahelpdesk.worldbank.org/knowledgebase/articles/378832-the-world-bank-atlas-method-detailed-methodology>.
- World Bank. 2017d. "World Bank Country and Lending Groups." Accessed October 23, 2017. <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>.
- World Bank. 2017e. "Historical classification by income in XLS format." Accessed October 23, 2017. <http://databank.worldbank.org/data/download/site-content/OGHIST.xls>.

## Appendix: Methods and Materials

### Cross National Time Series (CNTS)

The Cross National Time Series (CNTS) database is a result of data compilation and systematization started by Arthur Banks in 1968 in the State University of New York Binghamton (see Banks & Wilson 2017 for detail). The work was based on generalizing the archive of data from The Statesman's Yearbooks, published since 1864. It contains approximately 200 indicators for more than 200 countries. The database contains yearly values of indicators starting from 1815 excluding the periods of World Wars I and II (1914–1918 and 1939–1945).

CNTS database is structured by sections, such as territory and population, technology, economic and electoral data, internal conflicts, energy use, industry, military expenditures, international trade, urbanization, education, employment, legislative activity, etc.

In our paper, we take a close look at the data describing internal conflicts (domestic). This section includes data starting from 1919 based on the analysis of events in 8 various subcategories, which are used to compile Integral CNTS Index of Sociopolitical Destabilization (domestic9). In building the general Index, the compilers of CNTS database give each category a certain weight (Table A1).

**Table A1.** Weights of subcategories used in compiling the Integral CNTS Index of Sociopolitical Destabilization

Subcategory	Variable name	Weight in domestic9 Index
Assassinations	domestic1	25
General Strikes	domestic2	20
Guerrilla Warfare	domestic3	100
Government Crises	domestic4	20
Purges	domestic5	20
Riots	domestic6	25
Revolutions	domestic7	150
Anti-Government Demonstrations	domestic8	10

To calculate the Integral CNTS Index of Sociopolitical Destabilization (Weighted Conflict Measure, domestic9) the numerical values of each subcategory are multiplied by their corresponding weights, the results of the multiplications are summed up, then the sum is multiplied by 100 and divided by 8 (equation (1)).

$$domestic9 = \frac{25 domestic1 + 20 domestic2 + 100 domestic3 + 20 domestic4 + 20 domestic5 + 25 domestic6 + 150 domestic7 + 10 domestic8}{8} *$$

100

(1)

## **Description and Methodology of the Calculation of Independent Variables**

Yearly GDP per capita (2011 international \$, PPP) data have been taken from the World Bank World Development Indicators database (World Bank, 2017a).

For restoring data from 1960 until 1990, the data on GDP per capita growth rates (World Bank, 2017b) have been employed. For testing hypotheses, data from 1960 until 2015 are utilized.

Groups of countries by income have been aggregated on the basis of GDP per capita (PPP) values (based on optimization of the World Bank's methodology (World Bank, 2017c, 2017d)).

In fiscal year 2016, the World Bank identified the following groups of countries by income per capita criterion:

Low-income economies/countries—with GNI (gross national income) per capita up to \$1,045<sup>52</sup>;

Lower middle-income economies/countries—with GNI (gross national income) per capita from \$1,046 to \$4,125;

Upper middle-income economies/countries—with GNI (gross national income) per capita from \$4,126 to \$12,735;

High-income economies/countries—with GNI (gross national income) per capita more than \$12,735 (World Bank, 2017d, 2017e).

However, using this widely acknowledged classification in our research has turned out to be connected with the two following challenges:

1) Unlike the data on GDP, in the World Bank database there are too many omissions for GNI data that cannot be restored (especially for the period before 1980); for this reason, it has turned out to be more expedient in our case to take as a basis not GNI per capita, but GDP per capita data (that we have managed to restore for the overwhelming majority of countries over the whole period of 1960-2015).

2) The division of countries by the above-mentioned World Bank classification is rather imbalanced. Indeed, both high income countries group and low income countries group include countries with approximately a billion people in each group (that corresponds to a notion of the “golden billion” popular in Russia and Collier’s “bottom billion” (Collier 2007)). Middle income countries contain the rest of the world’s population—about 5 billion people! This problem was partly solved by the World Bank by dividing middle income countries into two sub-categories: “lower-middle income countries” and “upper-middle income countries”. Even this procedure has solved the problem only partly as either of

---

<sup>52</sup> Note that the calculation is made using a special method, known as the Atlas method (for description of the method see: World Bank 2017c).

two categories contains more population than low and high income countries altogether.

To solve this problem, we classify countries (more precisely, “country-years”) of the period of 1960-2015 into the following six sextiles by GDP per capita (2011 international dollars, PPP):

The 1st sextile—up to \$1,6600

The 2nd sextile - \$1,660 - \$3,280

The 3rd sextile - \$3,280 - \$6,470

The 4th sextile - \$6,470 - \$12,100

The 5th sextile - \$12,100 - \$23,600

The 6th sextile—from \$23,600

For 2014, the correlation between our sextiles and the groups of countries by income according to the World Bank classification looks as follows (Table A2):

**Table A2.** Correlation between two classifications.

Groups of countries by GNI per capita distinguished by the World Bank					
Sextiles of countries by GDP per capita	Low income	Lower-middle income	Upper-middle income	High income	<b>Total</b>
the 1st	17	0	0	0	<b>17</b>
the 2nd	10	15	0	0	<b>25</b>
the 3rd	0	16	5	0	<b>21</b>
the 4th	0	12	17	0	<b>29</b>
the 5th	0	0	26	10	<b>36</b>
the 6th	0	0	3	42	<b>45</b>
<b>Total</b>	<b>27</b>	<b>43</b>	<b>51</b>	<b>52</b>	<b>173</b>

As we see, between the groups of countries by GNI per capita distinguished by the World Bank and our six sextiles of countries by GDP per capita we observe a very strong correlation (when calculating its strength by means of Spearman's rank correlation coefficient, its level turns out to be as high as 0.924). In general, all countries of the 1<sup>st</sup> sextile belong to the group of low income countries by the World Bank classification, the majority of countries of the 2<sup>nd</sup> and the 3<sup>rd</sup> sextiles—to the group of lower-middle income countries, the majority of countries of the 4<sup>th</sup> and the 5<sup>th</sup> sextiles—to the group of upper-middle income countries, almost all the countries of the 6<sup>th</sup> sextile—to the group of high income countries.

This enables us to assign to our sextiles the following notations keeping some appropriate conformity with the World Bank's widely accepted classification of world economies into income groups:

The 1st sextile = low income countries;

The 2nd sextile = the lower echelon of lower-middle income countries;

The 3rd sextile = the upper echelon of lower-middle income countries;

The 4th sextile = the lower echelon of upper-middle income countries;

The 5th sextile = the upper echelon of upper-middle income countries;

The 6th sextile = high income countries.